



PROFESSIONAL
Mechanical
Design



2020 EDITION

RYAN LEE Ph.D.

Comprehensive Exam Preparation Guidebook

Contains complete 6 sets of practice exam with solution

- Segment 1: Parts
- Segment 2: Configurations
- Segment 3: Assemblies
- Skill mastering hands-on practice examples

 Video tutorial & practice models access code inside

CSWP Exam Preparation

All-In-One Guidebook with Practice Exams

Intentional Blank

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All-In-One Guidebook with Practice Exams

By Ryan Lee

Aerospace Engineer, CAE Expert, Failure Analyst



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All-In-One Guidebook with Practice Exams

First published 2020

Author Ryan Lee

Publisher BW Publications

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ISBN 9798639140679



9798639140679

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Electrical Files:

Any drawing and CAD models associated with this book are only licensed to the purchaser. These files may not be released to the public.

Access Supplemental files

This book has tutorial files that accompany it. The one-time download link of these files can be accessed by scanning the provided QR code in Appendix A.

Preface

This book, *CSWP exam preparation: All-in-one guidebook with practice exams*, is written to assist students in college and universities, engineers, and professionals who are interested in getting a certification of CSWP (Certified SOLIDWORKS Professional). There are so many books available for learning SOLIDWORKS, while there are very few books to help for CSWP exam preparation. To prepare for exams efficiently, future exam takers essentially need exam-oriented preparation books. There are some online/offline training programs. However, those are very expensive to prepare a \$99 CSWP exam. This book is divided into four parts. Part I covers introductory principles of CSWP, including fundamental knowledge of the CSWP exam. Part II covers the first segment of the CSWP exam mainly focusing on part modeling, including six practice exam sets. Also, key skills for passing the segment one exam are explained with various hands-on examples. Part III covers the second segment of the CSWP exam focusing on the configuration and design intent. Part IV covers the third segment focusing on the assemblies and mates. The structure of Part II ~ Part IV is almost identical. Organizing the book in this way is to help the students, engineers, and professionals to prepare the CSWP exam efficiently. This book has a significant number of pictorial descriptions of the steps with screenshots that a student should follow. Since 2018, the format of the CSWP exam has been updated. However, the problem pattern covered by the exam and the required SOLIDWORKS skill does not change significantly. To help adapt to this new format, two sets of updated tests form are included in each part. The first practice test set for each part is provided with a walkthrough instruction that includes a step-by-step problem-solving process, and the rest of the practice test sets are provided with the answers in the end-of-section. Time management is essential in CSWP, so it is recommended that you practice by completing the test within the specified time. It is hoped that students and engineers will find this edition useful for passing the CSWP exam in the first attempt.

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Part 1

Introduction to CSWP

Introduction to CSWP

When you complete this chapter, you will learn

- ▶ Overall CSWP exam concept
 - ▶ Understand the worth of CSWP certification
 - ▶ Effective exam preparation method
 - ▶ How to use this book efficiently
-

1.1 How to Use the Book

Who this book is for

This book is specially designed for SOLIDWORKS users who are interested in becoming **Certified SOLIDWORKS Professionals (CSWP)**. Although this book is intended mainly for the CSWP, the **Certified SOLIDWORKS Associate (CSWA)** can be easily passed if you have studied the contents of this book. This book does not require any prerequisite knowledge or skills to follow on since the book guides the future test takers from the basics of CSWP. However, if you have some basic experience with SOLIDWORKS, you will easily pass the certification exam with the guide of this book. Also, the basic theoretical background of “what 3D modeling is” given would be helpful.

What this book covers

The CSWP is composed of three segments and tests the following essential skills. It will take three and a half hours long to complete the test. In 2018, the format of computer-based testing (CBT) for the CSWP exam had changed slightly. However, the topics covered in general have not changed significantly, and the preparation strategy for the exam has not changed too. In the new exam format, the previously presented models are also used. However, the variables or the dimensions of the model are continuously revised. Although the information on the previous exam format can often be found online, there is not much data on the new exam format. However, it does not deviate significantly from the covered topic of the previous exam format. In this book, we prepared all hands-on exams for both exam forms which enables readers to adapt to the new exam form for readers. The contents of this book are as follows.

- **Segment 1: Parts**
- **Segment 2: Configurations**
- **Segment 3: Assemblies**

To pass each section, you will need to score **75%** or higher. Once you pass all segments, you will receive your CSWP certification. The best way to prepare for the CSWP is to practice hands-on CSWP exam with the guidance of this book. This book includes the following contents:

Part 1, Introduction to CSWP, covers what CSWP is and how to prepare the test with this book. It also explores the necessary skills required to pass the test.

Part 2, Segment 1: Parts, guide you on how to prepare segment 1 of CSWP. It has a full walkthrough sample exam of segment 1 with six additional practice exams. It covers the essential skills used for the Parts segment.

Part 3, Segment 2: Configurations, and Part 4, Segment 3: Assemblies, also guide you on how to prepare each segment. Each part has a full walkthrough sample exam with six additional practice exams. It covers the essential skills used for the Parts segment. Also, readers are advised to download the instruction of the exam questions and the video tutorials to crosscheck your work.

The appendix includes ten practice models for 3D Part modeling exercises. As you might know, the most important skill in CSWP is efficient and speedy 3D part modeling. The essential skill is to capture the design intent by looking at the drawings and create the precise 3D model through the fastest and most effective modeling process. This book will help you prepare the exam and pass it at once by practicing sample exams that are very similar to real exam questions.

Download the exam model files

You will need to have access to the model files to check the solution of each practice exam set. You can download the SOLIDWORKS files for this book by scanning the QR code provided in the Appendix.

Also, you could request the model files by registering at the below site. Then, the files will be emailed directly to you.

<https://sites.google.com/view/bw-engineering/Services/registercswp>

In the text, the symbol  in the figure below indicates that the SOLIDWORKS model is included in the provided download folder. Download the models and use them for your practice.

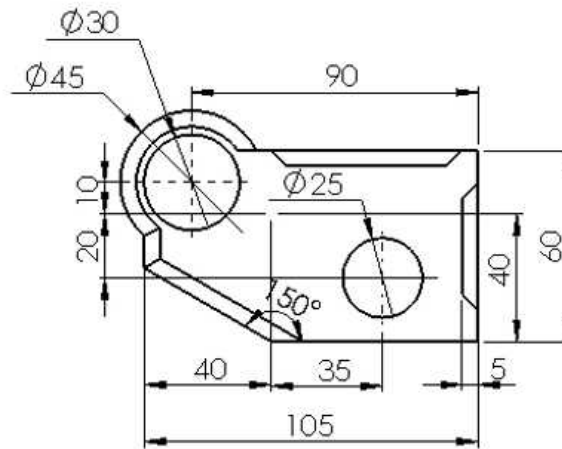


Figure 4 Sample Drawing  P2.2_Sketch Example.SLDPR1

Get in Touch

Feedback from our readers is always welcome. If you have any questions or mistake findings in any aspect of this book, we would be grateful if you would email us directly. Please contact us at FEM.Engineer@yahoo.com

1.2 Why CSWP



Figure 1 CSWP Logo

Getting Certified in SOLIDWORKS: Is it worth?

SOLIDWORKS is one of the industry-standard CAD software that is used for the design and analysis of mechanical parts and assemblies. SOLIDWORKS has become very popular due to its user-friendliness and cost-effectiveness for small-to-medium enterprises. According to the SOLIDWORKS user data, there are more than 3 million users globally. Only 3% of users among them have passed the CSWP exam, and only 0.1% of all SOLIDWORKS users have CSWE (Certification of SOLIDWORKS Expert). Engineering CAD users can pass SOLIDWORKS certification exams to demonstrate their skills and earn industry-certified certifications. In a highly competitive job market, SOLIDWORKS certification is a testament to design expertise and acquiring excellent work skills. SOLIDWORKS offers various certifications depending on the skill-level, from basic-level such as CSWA to expert-level CSWE. There are three levels of certification: CSWP Associate, Professional, and Expert. CSWP certification is the most demanding qualification for 3D CAD professionals. The CSWP (Certification of SOLIDWORKS Professional) is just a more advanced CSWA. The part modeling is more challenging and requires much more in-depth thought, attention to detail, and adequate design intent.

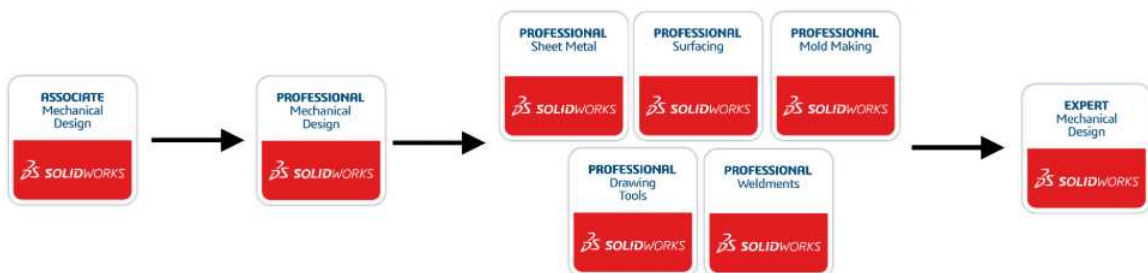


Figure 2 Journey to SOLIDWORKS Certifications Expert (CSWE)

When you see an engineer who has CSWP, you tend to think that this is someone who has the industry experience and has used SOLIDWORKS at a professional level. According to the certification catalog, a CSWE can solve practically any modeling problem given to them and is traditionally the go-to SOLIDWORKS user among their colleagues. You need to pass four of five specialty professional exam to attempt CSWE. These certificates are definitely worth it. If these certificates are included in your resume in the recent highly competitive engineering job market, it will be an attractive factor to employers and have a better chance of hiring.

CSWP is a relatively inexpensive test and can be taken free of charge for all users. The total price of the CSWP is \$99, and CSWE is \$149. If you are one of their training program attendees or event attendees, you will receive a free voucher for taking the exam. In addition to the cost of this test, many users rely on some expensive training courses from numerous online vendors. It's also important to point out how many free resources are available on online sites and YouTube, including countless tutorials and tips. This book is prepared in such a way that you can practice enough real-like CSWP questions without spending a lot of money.

Generally, the passing rate of CSWP exam takers is 74%. Even CSWE is much lower than that. Passing the CSWP exam is difficult, which means preparation is the critical element. If it was easy, then anyone could have done it and would be differentiated from others. Therefore, you need to prepare and practice thoroughly before purchasing the CSWP exam.

If you complete the exam and submit the answers, your score will be displayed on your screen immediately. If you pass the exam criteria, generally 75%, you will receive an email link to SOLIDWORKS electronic certificate access page. You can take the printout of the electronic certificate. From then, you can add this certification to your resume and professional profile such as LinkedIn. The below image is the electrical certification I got a couple of years ago. It feels pretty good when you see these certifications after your hard work preparation.

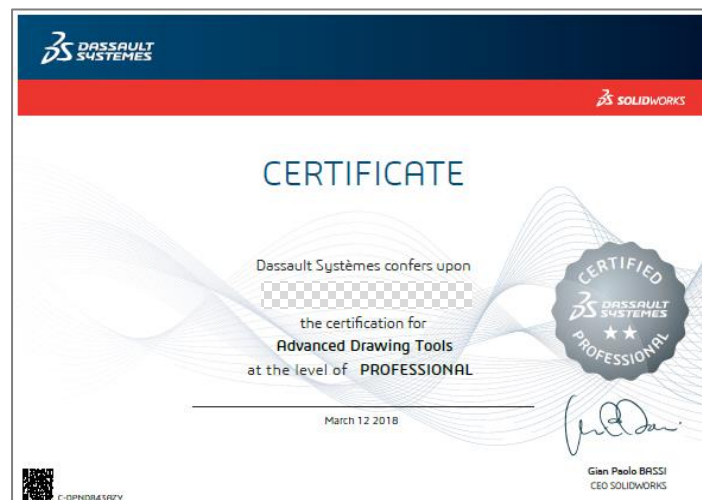
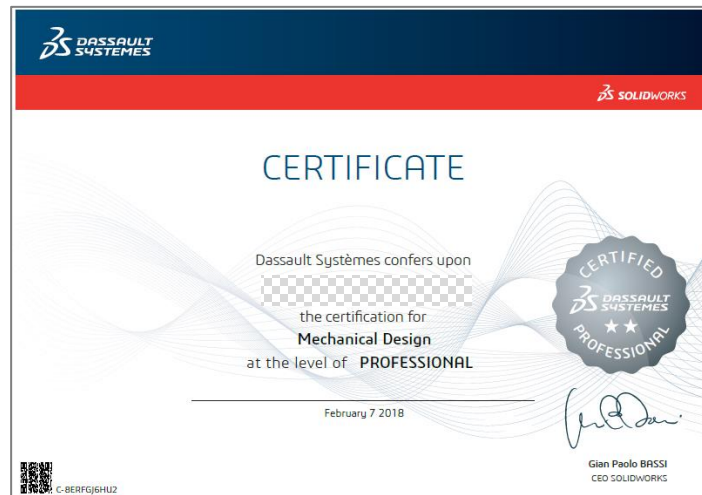


Figure 3 CSWP Certification Examples

1.3 Guidelines for CSWP preparation

Best ways to pass the CSWP exam on the first try

The best way to prepare for the CSWP exam is to have hands-on experience of the CSWP exam. This book is **Exam-Oriented Book** rather than a step-by-step knowledge building book. If you have basic experience with SOLIDWORKS and practice six sets of hands-on CSWP exams that are provided in this book, you will be able to pass the CSWP exam in a single attempt.

How long you have to prepare

How much time do we need to prepare for the CSWP exam? It all depends on how much knowledge you have with SOLIDWORKS. If you are an **User** who routinely uses SOLIDWORKS in your work or study, you can easily pass without any difficulty, if you practice the hands-on problems in this book. The CSWP exam duration is 3.5 hours long and consists of three segments. Thus, if you are an intermediate user and can devote two to three hours a day, you will be able to practice six sets of all problems contained in this book and master the basic skills within **Three Weeks**.

On the other hand, if you are **Beginner** to SOLIDWORKS and have no experience with basic part modeling or mechanical drawing, you may need a long time to prepare. At least, it will take one month to learn the basic skills of SOLIDWORKS and an additional one month to practice for the exams using this book. This duration will depend on your current skill level. Even a complete novice who knows nothing will be able to earn CSWP certification if they spend about **three months**. The CSWP is not so difficult exam if you only get used to testing patterns and have basic experience of SOLIDWORKS.

Best learning steps

There are many resources to start preparing for CSWP exams such as Books, On-line tutorials, YouTube videos, Classes, and most important: **self-study**. Some of them are expensive and others are not. If you have a basic understanding of SOLIDWORKS, then all you need is a **Hands-on Practice Exam with Guidance**. This book is an **Exam-Oriented Book**, and the contents of the book are organized to clear the exam in a single attempt. The preparation steps to achieve maximum effect with minimum effort are as follows:

- **Step 1: Learn about General CSWP Information.**

If you check CSWP's information through Google, you can get basic information by spending a couple of hours searching the data. Putting the big picture of the exam in your head and preparing for it can help you achieve your goals.

- **Step 2: Learn about the Most Basic SOLIDWORKS Skills (For Beginner).**

If you have enough experience working with SOLIDWORKS, you can skip this step 2 and get directly into preparation for the exam. If you are a new user of SOLIDWORKS, you have to train the basic skills of SOLIDWORKS. There are so many resources available on the Internet for free. The basic skills to prepare for the test are as follows:

- SOLIDWORKS user interface (2 hours): Learn how to use the main user interface and how to access various commands.
- **Sketching**: learn how to use the various sketching commands, how to create various geometry sketch efficiently, and how to manage your sketch. Required topics relating sketching are as follows:

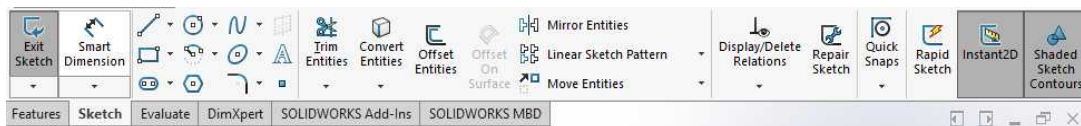


Figure 4 Sketch panel

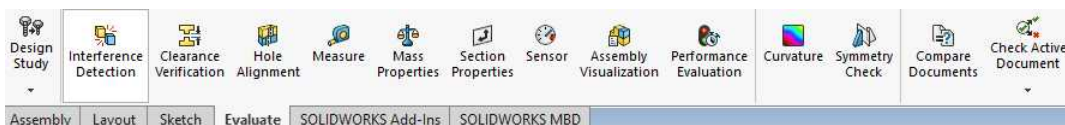


Figure 5 Evaluate panel

- Sketch entities - lines, rectangles, circles, arcs, ellipses, centerlines
- Sketch tools - offset, convert, trim
- Sketch relations

- **Part & Features:** Learn how to create a 3D part using various features. Required topics relating to part creation are as follows:

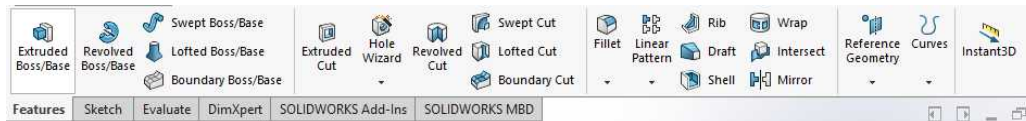


Figure 6 Feature panel

- Boss and cut features - extrudes, revolves, sweeps, lofts
- Fillets and chamfers
- Draft
- Shell
- Hole Wizard
- Linear, circular and fill patterns
- Linked dimensions
- Equations
- Mirror
- Dimensions
- Multi-body parts
- Mass properties
- Materials

- **Assemblies & Mate:** Learn the essentials of assembly creation using various mate options. Required topics relating assemblies and mate are as follows:



Figure 7 Assembly panel

- Inserting components - new and existing
- Standard mates and advanced mates
- Reference geometry – planes, axis, mate references

- In-context features
- Interference detection
- Suppression states
- Move/Rotate component
- Assembly features
- Collision detection in an assembly
- External references
- Design tables
- Dimensions and model items

- **Step 3: CSWP Exam Preparation with Hands-on Practice**

This step is to specifically train exam-oriented SOLIDWORKS topics. This book will give you everything you need for this step. Once you have trained and practiced for the exam with the help of this book, you can go ahead and purchase an exam attempt.

- **Step 4: Taking CSWP Exam and Add CSWP Certificate in Your Resume**

That's all the process to be CSWP.

Part 2

SEGMENT 1: Parts

Segment 1 Exam

When you complete this chapter, you will learn and practice

- ▶ Create a part from a drawing
 - ▶ Using linked dimensions and equations to aid in modeling
 - ▶ Using equations to relate dimensions
 - ▶ Updating parameters and dimension sizes
 - ▶ Measuring mass property analysis
 - ▶ Modifying geometry on an initial part to create a more complex part
 - ▶ Modifying parameters on the part at different stages while maintaining all other dimensions and design intent
-

2.1 Introduction of CSWP SEGMENT 1



Robotic Arm Assembly

Introduction

CSWP core certification exam is offered in three separate segments. This book was prepared to help the user to take and pass the CSWP core exam. Users can take each segment separately in any order. The first exam is not a requirement for the second and the third exam. The first segment duration is 70 min, with 11 questions. 75 points out of 105 points are required to pass the exam. The previous exam format was having 90 min, with 6 questions that had more demanding tasks in part modeling.

Although the CBT (Computer Based Testing) format of the CSWP question has slightly changed in 2018, the covered topics of the exam remain almost the same. CSWP segments 1, 2, and 3 require 14 days waiting period to retake the segment exam. Following is a general description of each question in the previous exam format. It could be different case-by-case. Most questions request the mass of the model to evaluate the modeling accuracy. The new CBT format of the CSWP covered almost similar topics, but in some cases, it could be more challenging. The previous test content or model may be carried in the same way as the new format of the exam. The models for each part of the segment can vary from time to time. But the variable dimensions do change every time. Also, it states that it does not allow the use of others' models.

Previous CSWP segment 1 format (2015-2018)

❖ 90 min/ 6 Questions

- Question 1. General introduction (0 points)
- Question 2. Model creation based on the provided drawing (25 points)
- Question 3. Make modification by updating the parameters (20 points)
- Question 4. Additional features creation and modification (25 points)
- Question 5. Additional features creation and modification (25 points)
- Question 6. Make modification by updating the parameters (20 points)

New CSWP segment 1 format (2018 ~ Current)

❖ 70 min/ 11 Questions

- Question 1. General introduction (5 points)
- Question 2. Model creation in **stage 1** (10 points)
- Question 3. Update parameters of stage 1 (10 points)
- Question 4. Update parameters of stage 1 (10 points)
- Question 5. Model modification in **stage 2** (10 points)
- Question 6. Update parameters of stage 2 (10 points)
- Question 7. Update parameters of stage 2 (10 points)
- Question 8. Model modification in **stage 3** (10 points)
- Question 9. Update parameters of stage 3 (10 points)
- Question 10. Update parameters of stage 3 (10 points)
- Question 11. Recover from model updating errors of stage 3 (10 points)

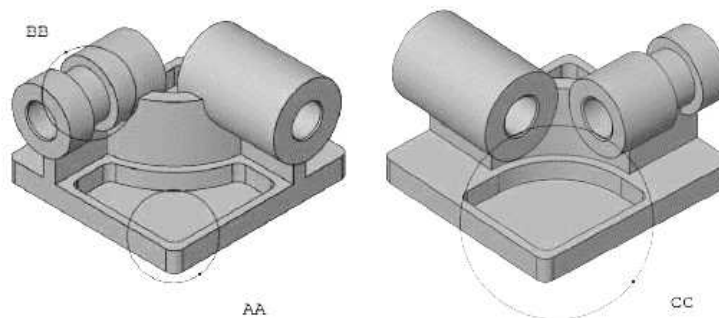


Figure 1 Sample part models of CSWP exam

The revised exam format has three primary stages (1, 2, and 3) to be modeled. **Question 2**(stage 1), **Question 5**(stage 2), and **Question 8**(stage 3) are the main modeling steps that require accurate modeling tasks. It can be expected that the time and effort needed for Part modeling has been reduced, through the total test time has been decreased (90min/6Q →70min/11Q).

You need to get **75 points out of 105 or better** to pass the first segment. The first model creation would be the most critical stage to get a high score since the following questions are somehow relative to the first model. The format of the first model question is multiple choice. **70 min** test for three questions of part modeling and modification with seven questions updating parameters could be demanding. If you make a mistake and need to fix it back, you may run out of time. Therefore, speedy modeling skill with accuracy based on the drawing is the highly required skill to pass the test. This book contains **Six** complete sets of Segment One, including **Two** sets of revised format used in the current CSWP exam. The exam usually gives a 1% margin of error to evaluate the correct answer. However, the updated test form explicitly describes **0.5% margin of error**. As mentioned previously, the most critical question is the first modeling question, which is the multiple-choice format. If you cannot find the exact value among these choices, the following questions will most likely to go wrong. So, you have to focus on the first question to get the correct part model.

2.2 Mastering Topics for Segment 1 exam

When you complete this section, you should be able to:

Segment 1: Parts (90 Minutes)

- Create a part from a drawing
- Use linked dimensions and equations to aid in modeling
- Use of equations to relate dimensions
- Update of parameters and dimension sizes
- Mass property analysis
- Modification of geometry on the initial part to create a more complex part



Differential gear box

Fundamental Skills of Sketching

In the CSWP test, creating an accurate sketch based on the drawing is one of the most important skills. In this part, you will learn how to create 2D sketches and how to use most sketch tools and how to create more complex shapes by combining individual sketch tools.

Basic operation and 'S' key

The first step to being successful in segment 1 is to learn: how to sketch. The figure below shows the sketch panel. The most commonly used sketches are lines, rectangles, and circles. It is also very important to set the appropriate dimensions.

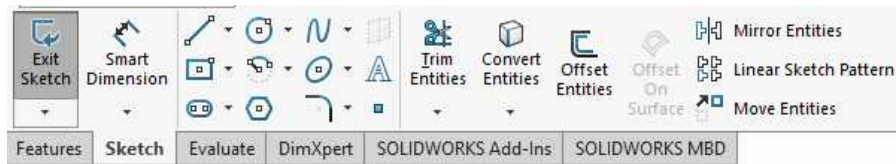


Figure 2 Sketch Panel

First of all, look at the drawing and select the **plane** and **origin** to sketch. The following figure is provided as a drawing sample, and when sketching you have to decide sketch plane and origin. In the sample drawing, you can see that many of the **dimensions are starting from a certain point** in the middle. In this case, we can create a base profile with that point as the origin. In general, it is better to start with the **principal plane** (top plane) of the base profile.

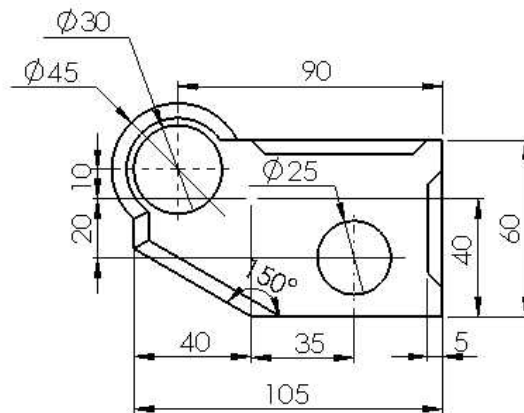


Figure 3 Sample Drawing  P2.2_Sketch Example.SLDPRT

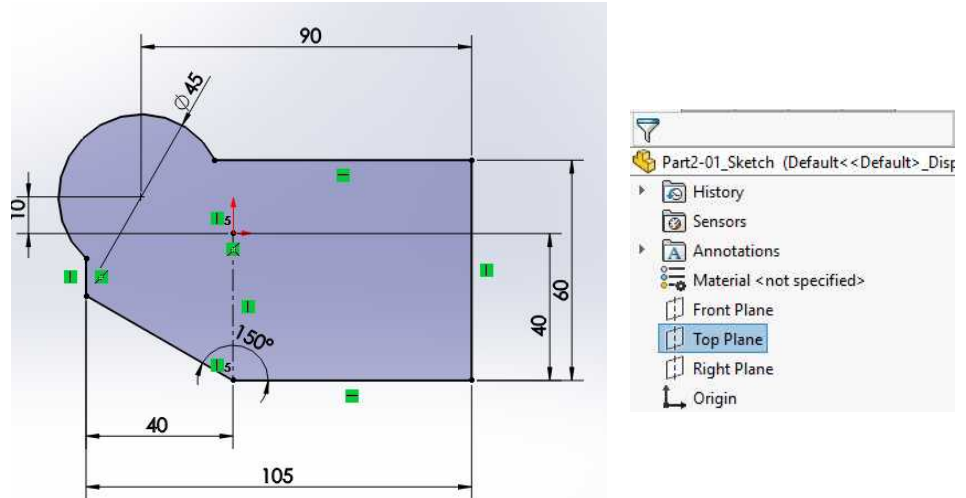


Figure 4 Sample sketch

The figure below is a drawing of a sample test sample provided by SOLIDWORKS. In this case, many dimensions start at the bottom right. So, in this case, it is useful to select the origin point at the bottom right.

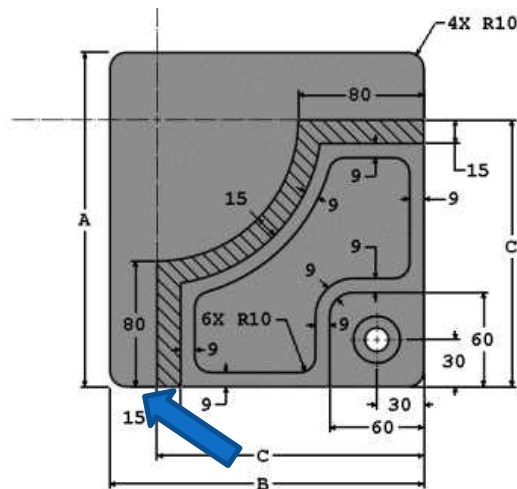


Figure 5 Sample Drawing

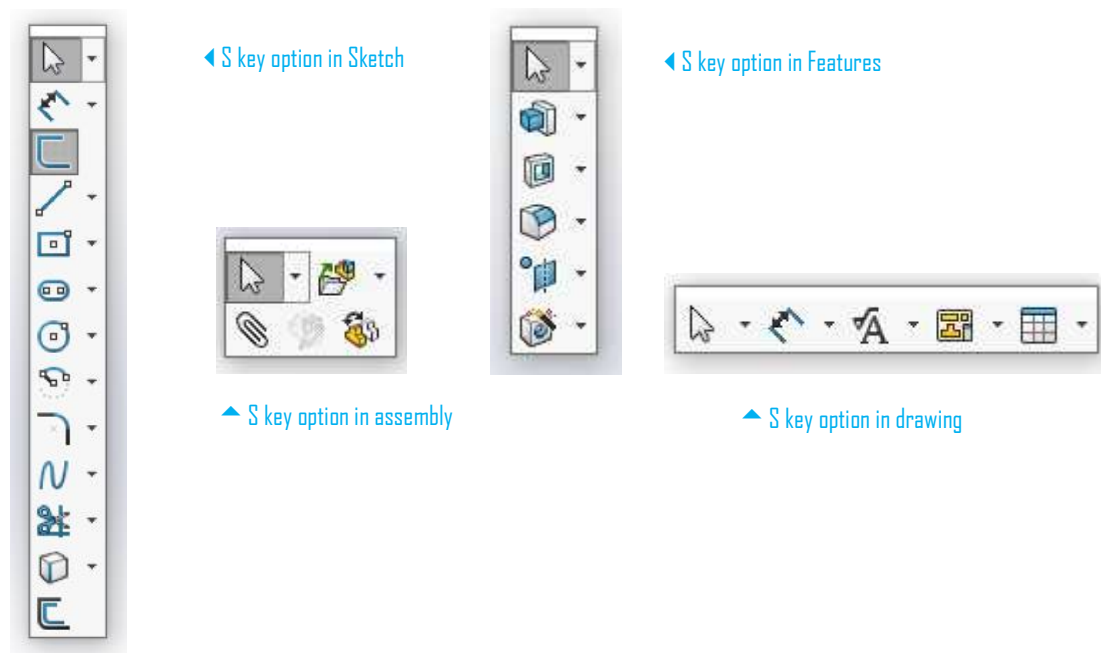
In the case of sketching in CSWP, it is created in a sketch plane and on a feature surface. In this case, the normal alignment of the plane is necessary. Use shortcut **Control + 8** to rotate screens to normal very quickly.

View shortcuts

This can be used to view your model in different ways, e.g. rotating to standard orientations:

- Zoom Out: Z
- Zoom In: Shift+Z
- Rotate Normal To: Ctrl+8
- Zoom to Fit: F/Double click MMB
- Magnified Selection: G
- 6 standard views + isometric: Ctrl+1-7

Another tool that helps to increase modeling speed is the use of **S key** option. The tools listed on the **S key** dialogue box is really useful in sketch and feature modeling. The default **S key option** is as shown below. There are four versions of shortcut bar, one each for parts, assembly, drawing and sketches. It can be customizable accordingly.



'**S**' key, shortcut bar is a user-customizable toolbar. The '**S**' shortcut bar intends to allow users access to commonly used commands in different stages with a very quick time.

'**S**' key is a useful tool for users who want to access to many commands with little mouse movement. Also, powerful for the exam taker to save modeling time. It is strongly recommended to use the **S key** function.

The line colors of Sketch

Creating a **fully defined profile** in a sketch is essential to create a correct profile. If you could not fully define to create a profile from a drawing, then you might have made a mistake somewhere. You can see this through the **line color** in the sketch. It is impossible to check the status in the book which is printed in black-white, but you can check the status of the sketch through line color displayed on the computer screen. Sketch states include **Underdefined, Overdefined, Fully Defined, Unsolvable, Zero Length, and Dangling**, and they are described as follows:

- **Blue: Underdefined**-The sketch entity is not completely defined. You can drag a portion of it to change size, position, or orientation.
- **Black: Fully Defined**-The sketch entity is fully defined by a combination of sketch relations and dimensions. The black line is locked entities and will not move if you try to drag it to another position.
- **Red: Overdefined—Not Solved** When a sketch entity has two or more relations and one of them cannot be satisfied, the unsatisfied relation will be red.
- **Yellow: Overdefined—Conflicts** Solving the sketch relations would be invalid such as self-intersecting curves
- **Brown: Dangling** it caused by not a part of a connected entity.

If your sketch does not turn black after completing the sketch, then there must be some missing dimensions or geometric relation. You should carefully recheck the dimensions or relations. So, do not extrude until your sketch is black. If your sketch turns red, it means that there must be unwanted relations or double dimensions in the sketch. To proceed with the next step, you have to correct the over-definition first. If your sketch entity turns yellow, then there are ambiguous or impossible relations. For example, two parallel lines are required to also be perpendicular or collinear or something like that. You have to resolve the problem before proceeding.

Geometric Relation

Geometric relations are used to force behavior on a sketch element. In SOLIDWORKS, there is automatically added relation function. Some sketch relations are added automatically as geometry is sketched without you knowing. In this case, be aware that there may be warnings or errors due to the addition of unrecognized relations.

There are several common sketch relations utilized in the CSWP exam.

Symbol	Relation	Sketch Entities	Relation meaning
	Coincident	A point and a line or arc/circle	The point lies on the arc or line
	Collinear	Two or more lines	Lines lie on the same theoretical infinite line
	Concentric	Two or more arcs/circles	Arcs/circles share the same center-point
	Co-radial	Two or more arcs/circles	Items share the same center-point and have equal radii.
	Equal	Two or more lines or two or more arcs/circles	Line lengths and arc/circle radii stay equal
	Horizontal	One or more lines or two or more points.	Lines become horizontal; points are aligned horizontally
	Vertical	One or more lines or two or more points	Lines become vertical; points are aligned vertically
	Parallel	Two or more lines	Lines become parallel
	Perpendicular	Two lines	Lines become perpendicular
	Tangent	An arc/circle or spline and a line, arc, or spline	Items remain tangent
	Symmetric	A centerline and two points. Lines, arcs or splines	Items remain symmetrical about the centerline



Midpoint

A point and a line

The point remains at the midpoint of the line.



Intersection

Two lines and one point

The point remains at the intersection of the lines. This can be a projected intersection



Pierce

A sketch point and an axis, edge, line, arc or spline

Sketch point becomes coincident to where the axis pierces the plane of the sketch

Sketch Hand-On Practice (5 sketch models)

We have provided hand-on sketch practice models that help you to train the various aspects of the sketch described so far. Let's sketch based on the provided drawing. Then measure the area and compare the result of yours. Use the **Measure** tools to calculate the area.

Hands-On Practice Sketch #1

- Practice time: 10 min
- Unit: MMGS (decimal digit 2)
- Extrude 1mm and measure the area of the sketch
- Key points on practice
- Use **Circle** option
- Use **Rectangle** option
- Measured Area: 4280.59 mm²

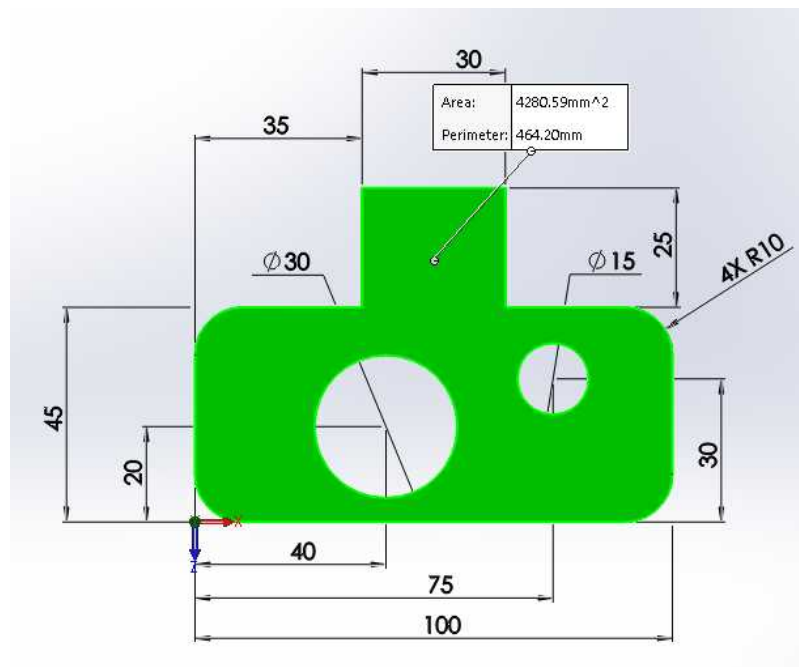


Figure 6 Sketch Practice #1 P2.2_Sketch Nol.SLDPRT

Hands-On Practice Sketch #2

- Practice time: 10 min
- Unit: MMGS (decimal digit 2)
- Extrude 1mm and measure the area of the sketch
- Key points of the sketch
- Decide proper **Origin point**
- Use **Straight Slot** option
- Measured Area: 278.16 mm²

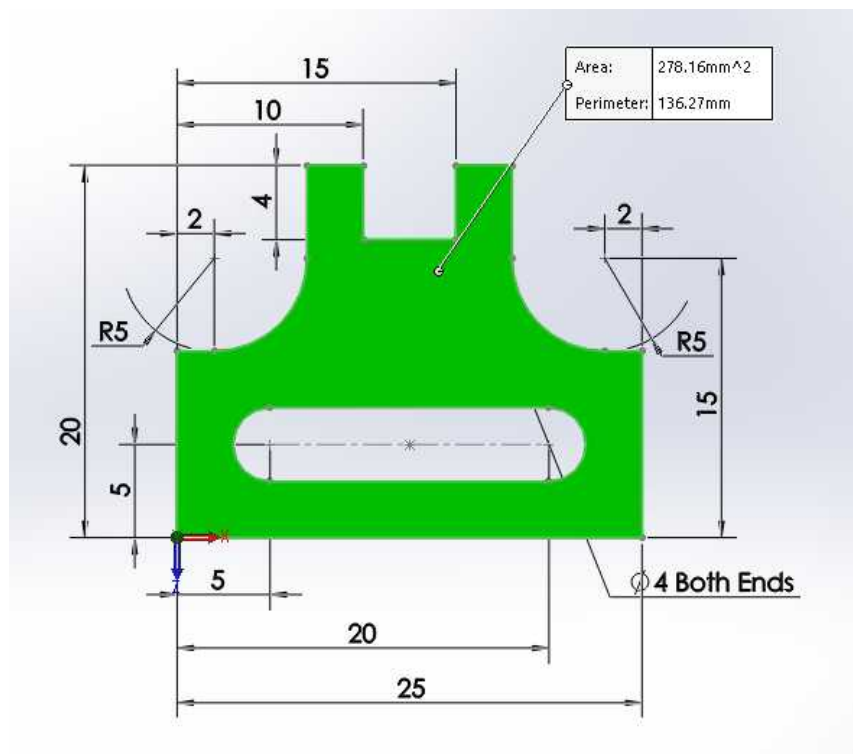


Figure 7 Sketch Practice #2 [P2.2_Sketch No2.SLDPRT](#)

Hands-On Practice Sketch #3

- Practice time: 12 min
- Unit: MMGS (decimal digit 2)
- Extrude 1mm and measure the area of the sketch
- Key points of the sketch
- Use **Symmetry** geometry
- Measured Area: 779.58 mm²

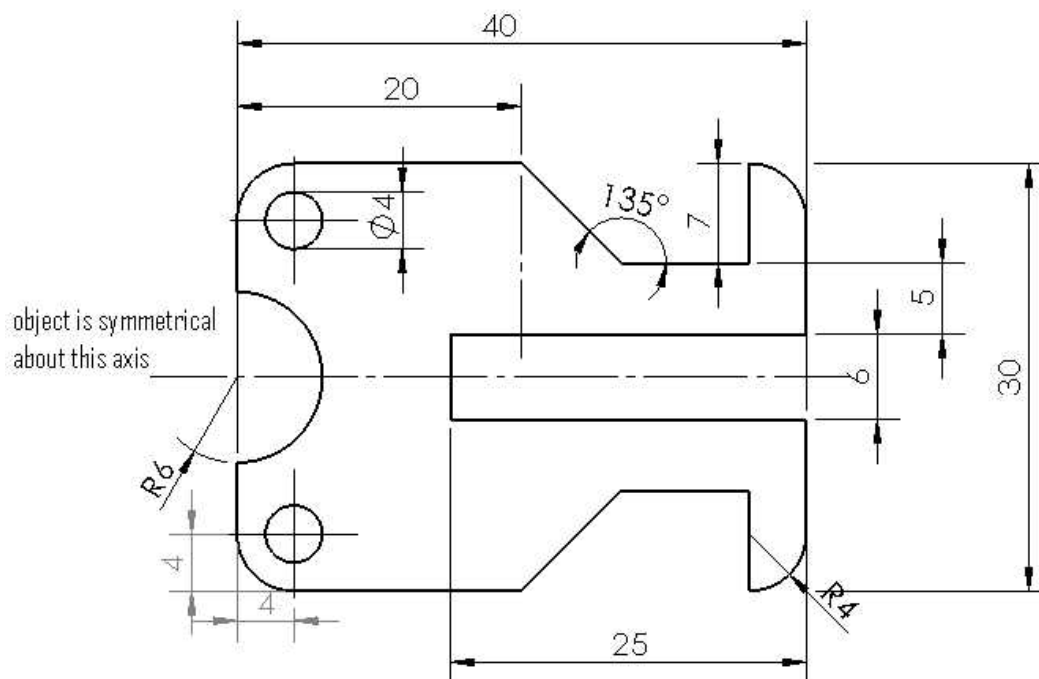


Figure 8 Sketch Practice #3 P2.2_Sketch No3.SLDPRT

Hands-On Practice Sketch #4

- Practice time: 5 min
- Unit: MMGS (decimal digit 2)
- Extrude 1mm and measure the area of the sketch
- Key points of the sketch
- Understanding **Geometric Relations**
- Measured Area: 8585.92 mm²

*Note: Tangent relation may not be explicitly indicated in actual testing. In some cases, it may be necessary to infer through drawing.

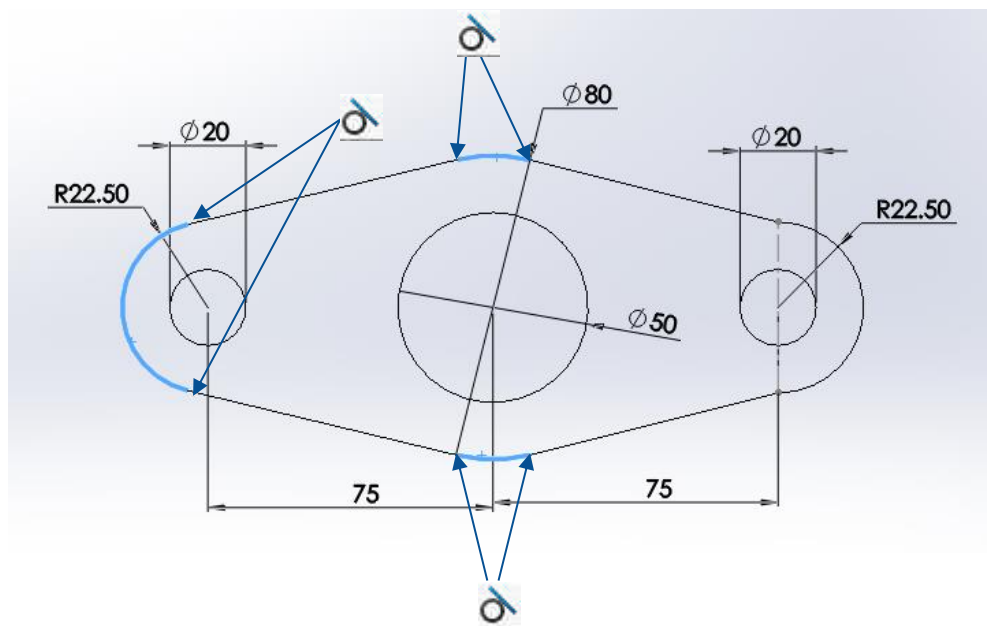


Figure 9 Sketch Practice #4  P2.2_Sketch No4.SLDPRT

Fundamental Skills of Features

SOLIDWORKS creates a 3D part based on Features. Therefore, it is one of the primary subjects of the CSWP exam. This part introduces the basic skills for Feature tools that are used to the CSWP exam. In the last chapter, we have learned about **Sketches**. Essentially, the key point of CSWP is to accurately predict the mass by generating 3D models. Therefore, the completed 2D drawing in the sketch must be converted to 3D accurately using the Feature tools. Feature tools categorized into five types: ① Extrusion features (extruded boss/base, extruded cut) ② Revolved features (revolved boss/base, revolved cut) ③ lofted features(lofted boss/base, lofted cut) ④ Swept features(swept boss/base, swept cut) ⑤ Modification features (hole wizard, shell, fillet, chamfer, pattern, mirror). Of these features, lofted features and swept features appear less frequently in the exam.



Figure 11 Feature Panels

Extruded Boss/Base

Extruded Boss/Base tool is used to add thickness or height to an existing 2D sketch. This might be one of the most used tools in the CSWP exam. Therefore, it is necessary to become familiar with the various options and functions provided by **Extruded Boss/Base**.

Here are some tips for extrusion tool usage for speedy modeling. There is a drawing as follows. In this case, there is an extruding method by sketching each feature as one-by-one. This allows you to create a part through four features.

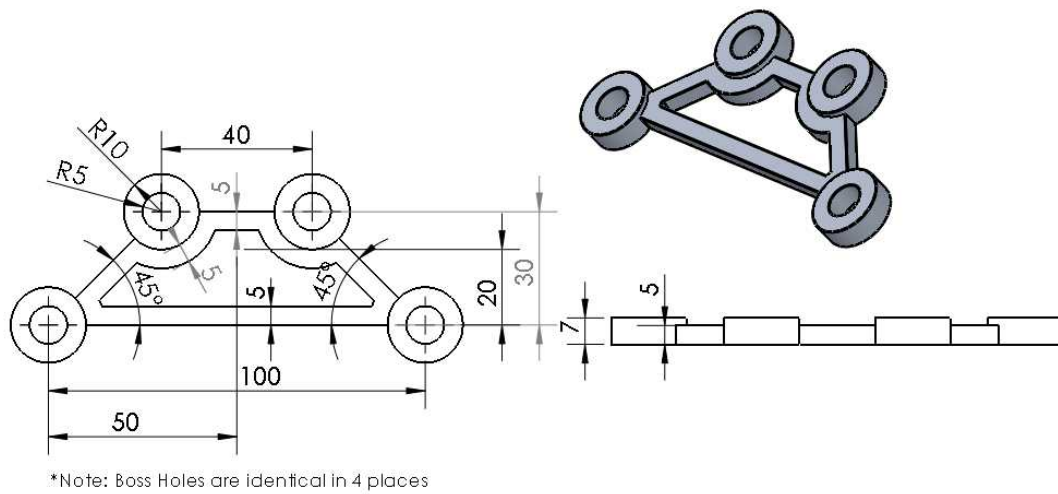
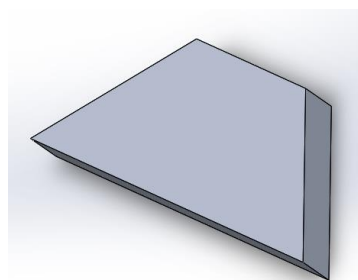
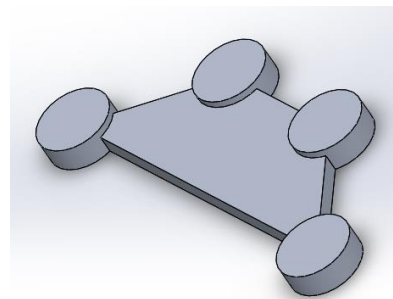


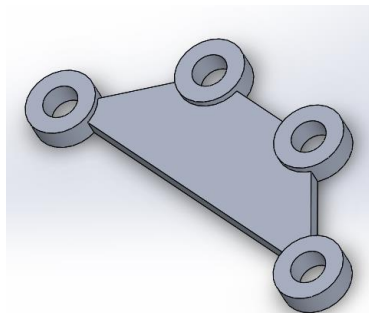
Figure 12 Extruded Boss/Base Sample Drawing P2.2_Extrude Not.SLOPRT



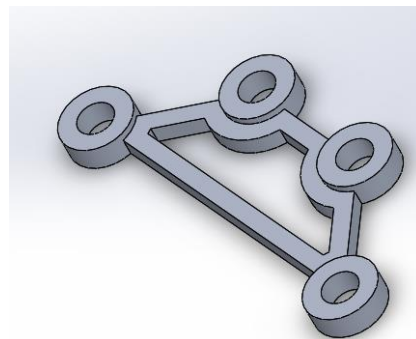
(1)



(2)



(3)



(4)

Figure 13 Extrusion Work Flow (typical)

On the other hand, for speedy modeling, most of the profiles are made as one sketch as below. Then, extrude multiple individual areas by selecting them from the **Selected Contour** from the extrusion option. The final step is to create offset inner curves and conduct cut-extrusion. Using this extrusion technique can save modeling time. Note that if there are dimensions that use **global variables** in this sketch, this method may confuse.

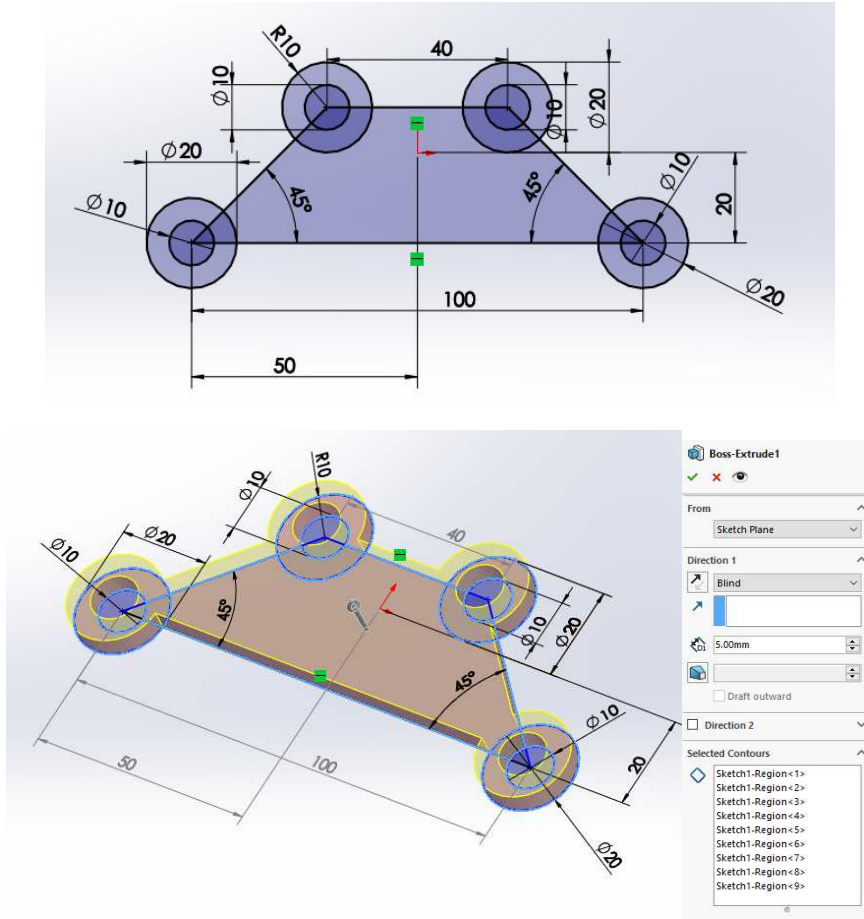
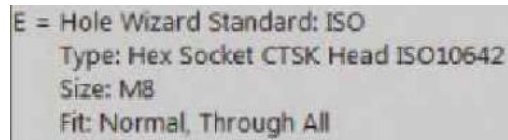


Figure 14 Extrusion multiple areas by using the Selected Contour option

Hole Wizard

Hole wizard is a feature tool that must be used once or twice in CSWP. The Hole Wizard tool is used to add nine different types of holes and slots to an existing 3D model.

The following image is a sample specification of the hole provided by the actual CSWP exam. The problem format informs the user to specify a hole location in the drawing and create a hole by using the **Hole Wizard tool** at the correct location based on the provided information.



E = Hole Wizard Standard: ISO
Type: Hex Socket CTSK Head ISO10642
Size: M8
Fit: Normal, Through All

The following is a sample using the **Hole Wizard**. Let's create a part using the drawing and the specs of **Hole E**(above), **F**, **G**. Then, measure the mass and compare it with the correct answer. Define the material as 1060 alloy and measure the weight.

Hands-On Practice Hole Wizard #1

- Practice time: 10 min
- Unit: MMGS (decimal digit 2)
- Material: 1060 Alloy
- Key points
 - Create Hole E, F, G using Hole Wizard
 - Select correct specification of hole and location
- Measured mass: 119.64 grams

F = Hole Wizard Standard: ISO

Type: Hex Socket Head ISO 4762

Size: M8

Fit: Close

End Condition: Blind 10mm

G = Hole Wizard Standard: ISO

Type: Tap Drills

Size: M8

Custom sizing: Ø12mm, tip angle 120deg

End Condition: Blind 10mm

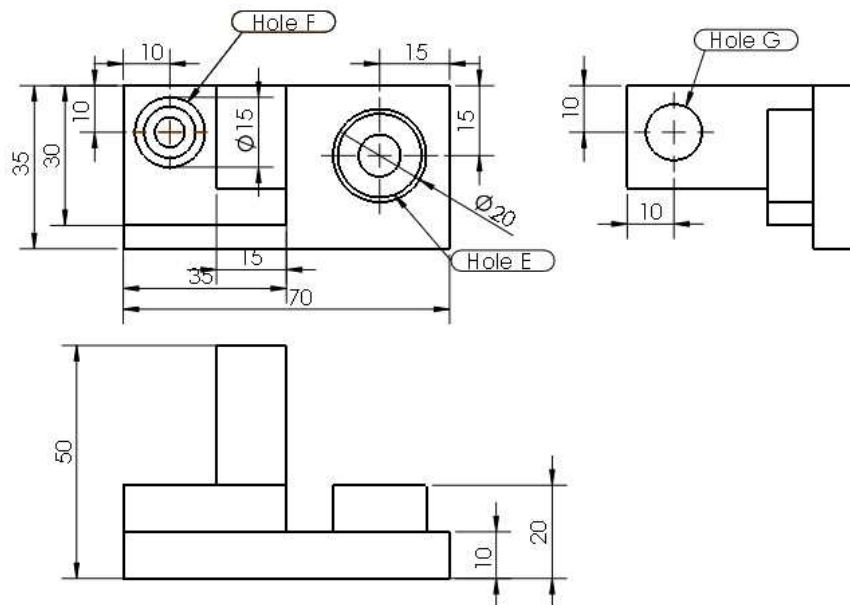
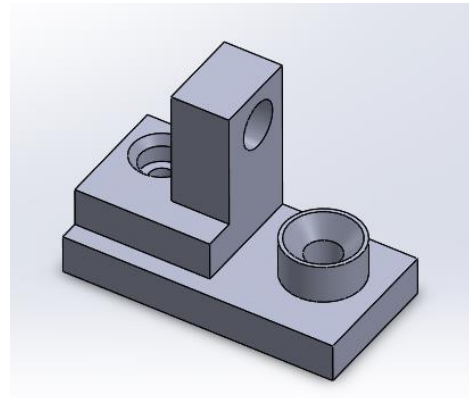


Figure 15 Hole Wizard Practice P2.2_Feature_HoleWizard_1.SLDPRT

Hole wizard usage is very straightforward. It is a feature that no mistakes can be made if you carefully check the Hole spec and set the location correctly. If the Hole wizard is not used, it can be described on the drawing using the following Hole symbols.

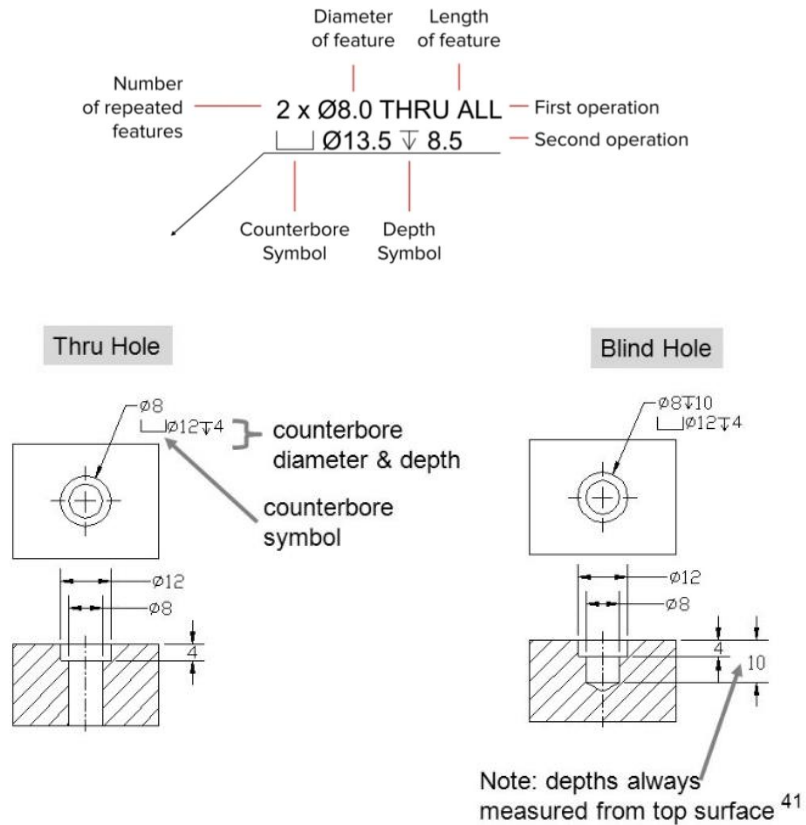


Figure 16 Hole description symbols

Chamfer and Fillet

When creating a part in CSWP segment 1, one of the popular ways is to model **the larger part** of the body first and gradually work on the **smaller part** to complete the model. Therefore, to reduce mistakes, **Chamfer or Fillet** should be done at the last in the modeling process.

Especially, in the multiple-choice problem in Segment 1, if there is no exact answer and if there is a slight far-off, then it's common to miss some edges to apply the fillet or chamfer, or it may be caused by an angle or size mistakes.

Hands-On Practice Chamfer and Fillet #1

- Practice time: 10 min
- Unit: MMGS (decimal digit 2)
- Material: 1060 Alloy
- Key points
 - Create Fillet (2) and Chamfer (4) correctly
 - Create unique color for fillet and chamfer for easy identification
- Measured mass: 119.64 grams

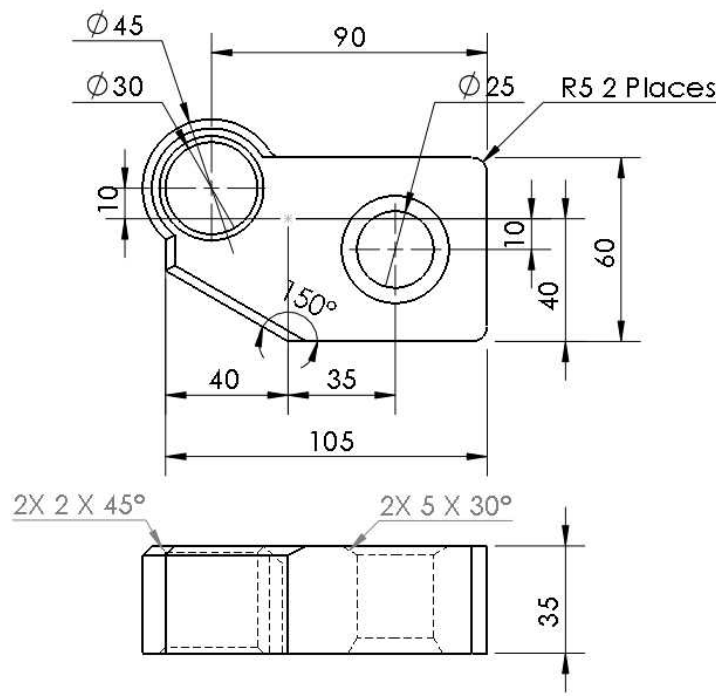


Figure 17 Fillet and Chamfer Practice P2.2_Feature_FilletNChamfer_1.SLDPRT

In SOLIDWORKS, the fillet tool provides four types: **Constant radius**, **variable radius**, **face fillets**, and **full round fillets**. Generally, drawings with **constant radius** cases appear to be in problems given in CSWP and many different sizes of fillets are specified in the drawings, so you must capture exactly what is shown in the drawings.

Similarly, chamfer has a variety of options, but CSWP uses mainly **distance-angle** type. If you learn the chamfer call-out format given in the drawings, you will be able to identify them without mistakes. For instance, distance-angle type: $4 \times 2 \times 45^\circ$ means 2mm distance with 45 degrees chamfer at four locations. Sometimes it could be displayed as: $2 \times 45^\circ$ 4 places.

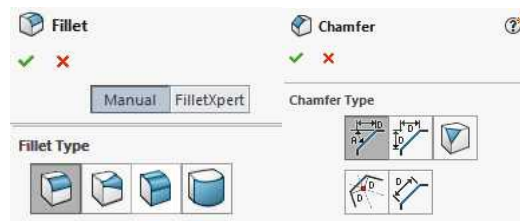


Figure 18 Fillet option and Chamfer option panel

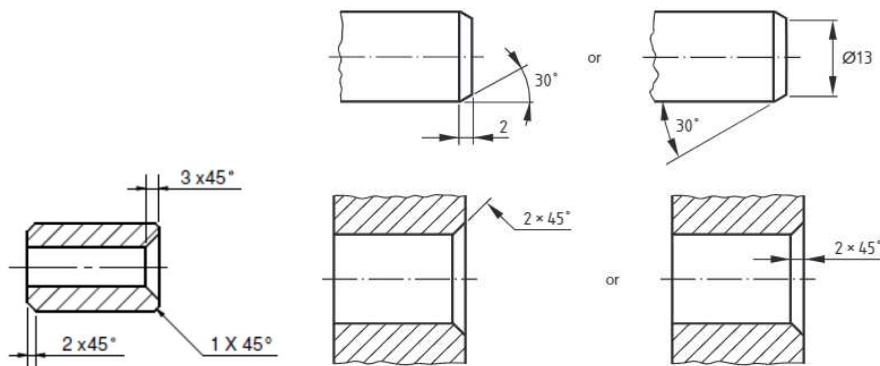


Figure 19 Chamfer dimensioning method

In the revised exam format applied since 2018, applying fillets or chamfers to the relevant area is also presented by a highlighted color to the drawing. This is done without specifying individual dimensions as shown in the below practice sample.

Hands-On Practice Chamfer and Fillet #2

- Practice time: 10 min
- Unit: MMGS (decimal digit 2)
- Material: Cast Alloy Steel
- Key points
 - Create Fillet and Chamfer as described in the note
- Measured mass: 374.90 grams

*Note: new fillets that need to be created are highlighted in **RED** in the images for better clarity. Likewise, chamfers in **BLUE**. There are 5 total fillets, R=5mm and 3 chamfers, 5X45°

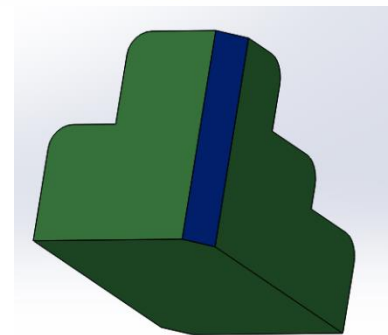
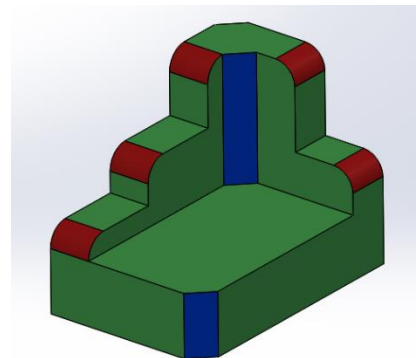
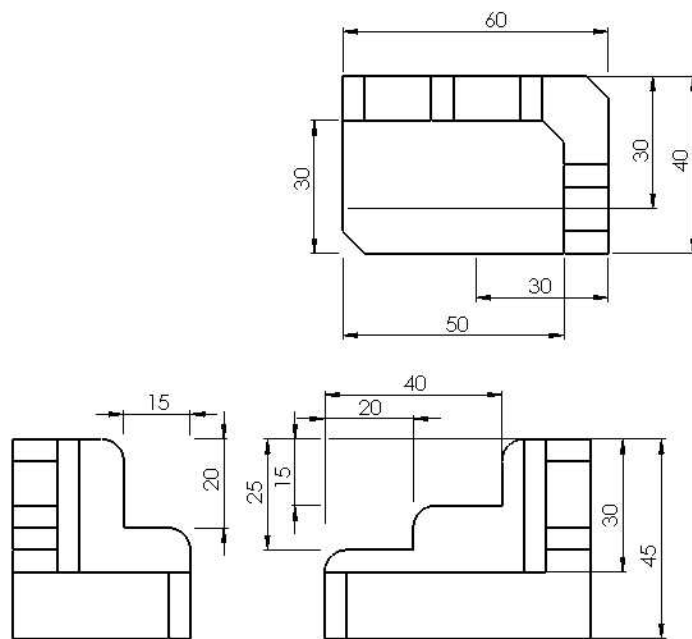


Figure 20 Fillet and Chamfer Practice ➔ P2.2_Feature_FilletNChamfer_2.SLDPRT

How to use Equations with Global Variables

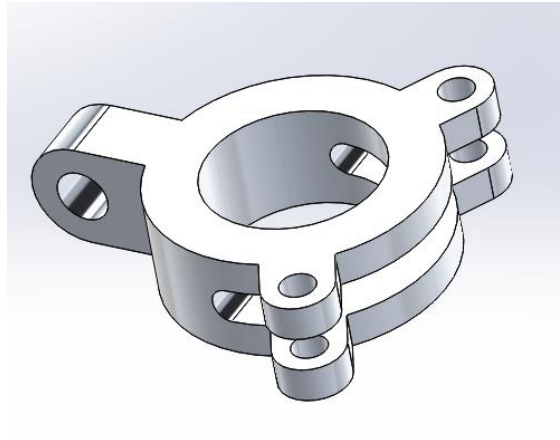


Figure 21 Hands-on model for Equation Practice  P2.2_Equation_No1.SLDPRT

In this chapter, we will learn how to use **Equation** with **Global Variables**, which is one of the frequently asked question types in CSWP.

Initially, the **Equation** icon does not appear in the Feature Manager. You can display it in the Feature Tree by selecting **Tools** → **Equation**. To display it at all times, go to **Options**, select **System manager** and select **Equation** as **Show**. You will always see the Equation icon in the Feature Manager. It may be a good idea to make these settings before starting the exam.

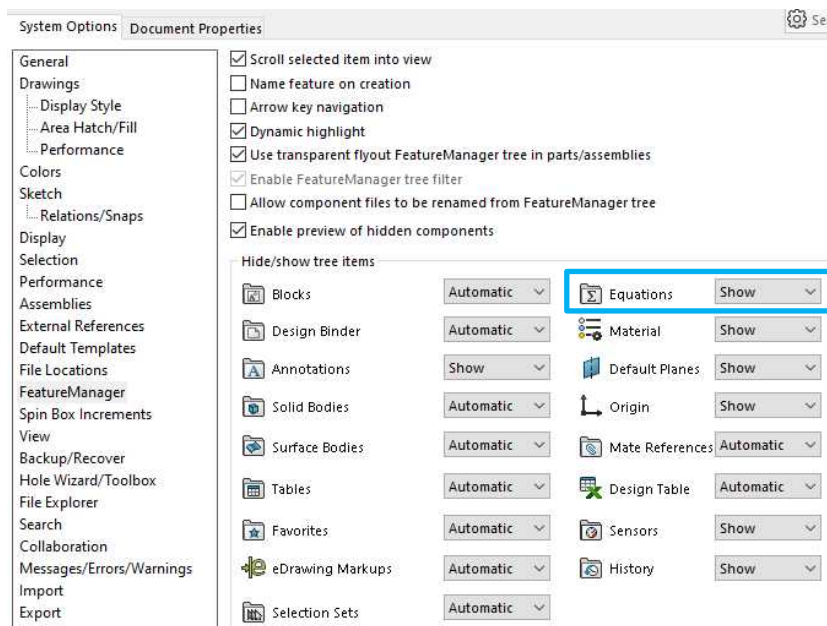


Figure 22 Setting to Display Equation Icon

When you deal with **Equation** problems, firstly, choose the **Equation** icon and RMB to select **Manage equation**. Enter global variables as described in the problem statement. Before entering corresponding values, read the problem thoroughly so that there would be no mistakes in global variables and input values.

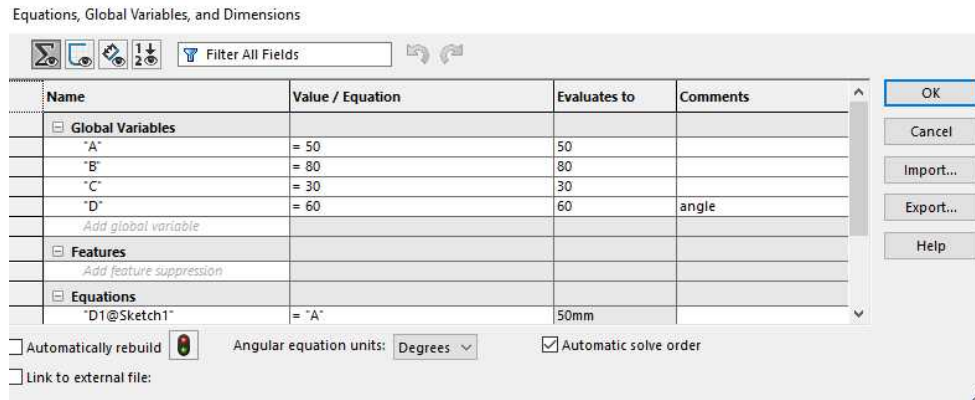


Figure 23 Manage equations

Let's create the presented model by using the equation as follows. The unit system is MMGS with two decimal points. First, sketch two circles to create a base sketch. If you enter '=' in the **Dimension field**, the previously entered global variables will be displayed. Select the corresponding values for these circles.

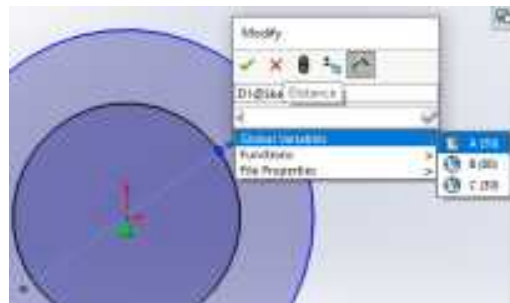
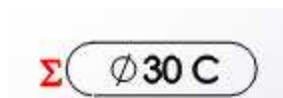


Figure 24 Use of global variables

If you input like this, the Equation mark (Σ) appears in front of Dimension. To make it easier to identify, enter global variables character(C) in the **Dimension text field** and select the inspection dimension circle. Then, it will show as follows:



It is very easy to identify whether it is correctly modeled later when compared to the problem drawing. You may want to find your method and use it for the real test.

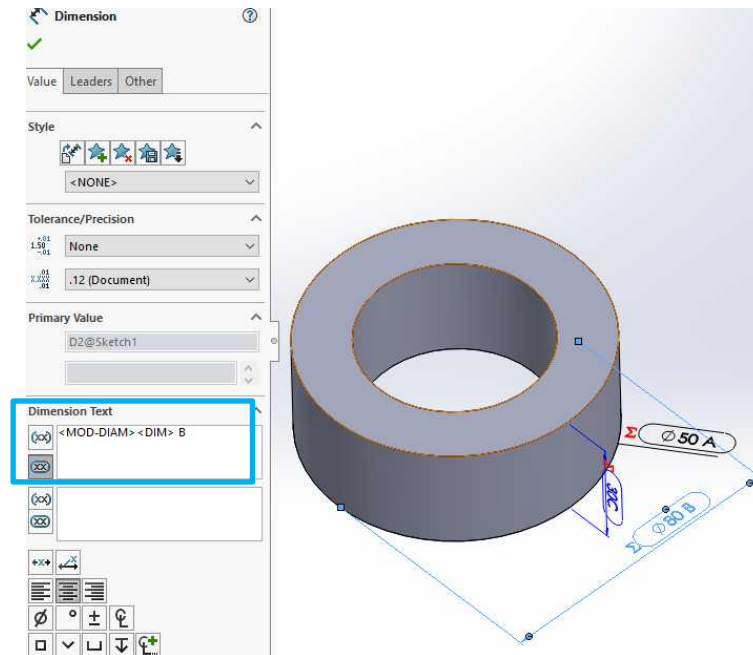
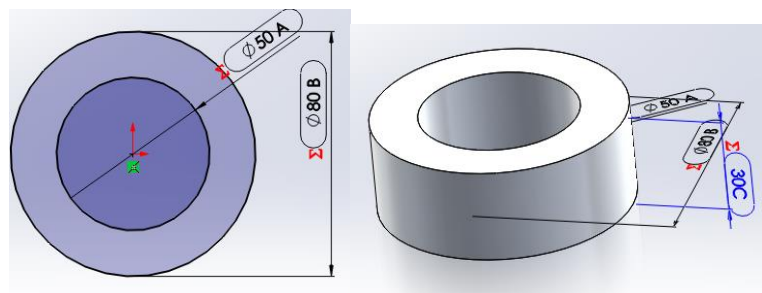


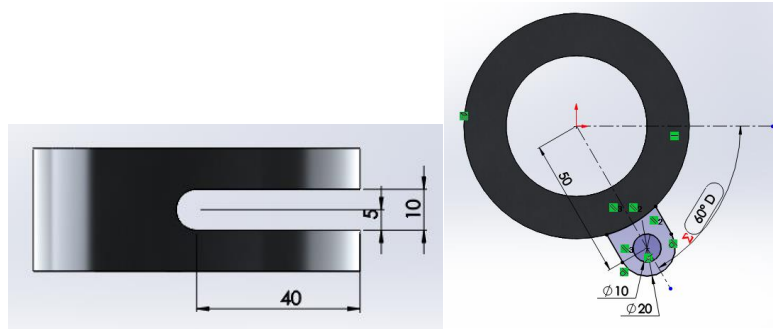
Figure 25 Enter global variables in dimension text

The series of figures shown below highlights the overall process for creating the presented model. Follow these to create a model using global variables and equations.

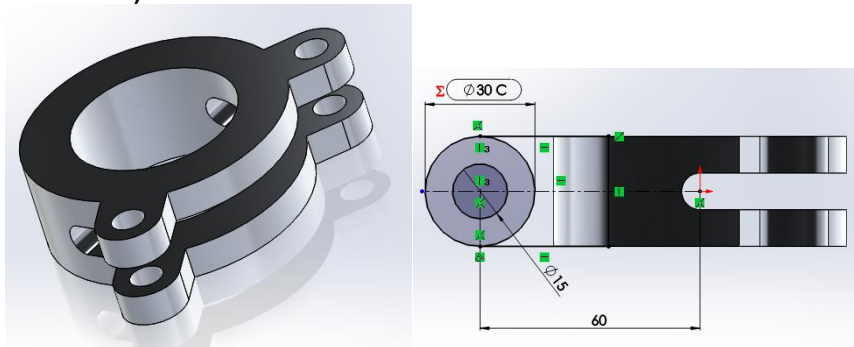
- **Step 1: Create a base circle profile and extrude (Global variables A, B, C)**



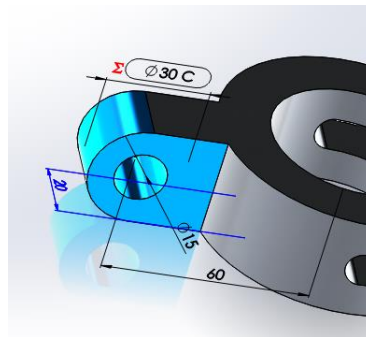
- **Step 2: Cutting through inner space and create a side lug profile and make extrusion (Global variables, D=60 degree angle)**



- Step 3: Mirroring to create additional lugs and create main lug profile (Global variable C)



- Step 4: Extrude the main lug



There may be various approaches to creating this model. You can follow the procedure provided above, or you can create this model with your method using the provided information.

Set the material to 1060 alloy and then measure the mass. The measured mass is **277.18 grams**. Then change the global variables of the equation as follows and measure the mass again.

Global Variables	
"A"	= 45
"B"	= 70
"C"	= 36
"D"	= 45

Then, you might have something weird model like as shown below. It might be different and depends on how you create the above model. This type of error is one of the common errors in Segment 1 since linked variables somehow related to the existing normal dimension with geometry relations. So, when you look at the drawing, be careful with geometric relations associated with linked variables. **“Don’t assume anything and calculate dimension in your own head.”** Just sketch and draw as what drawing said.

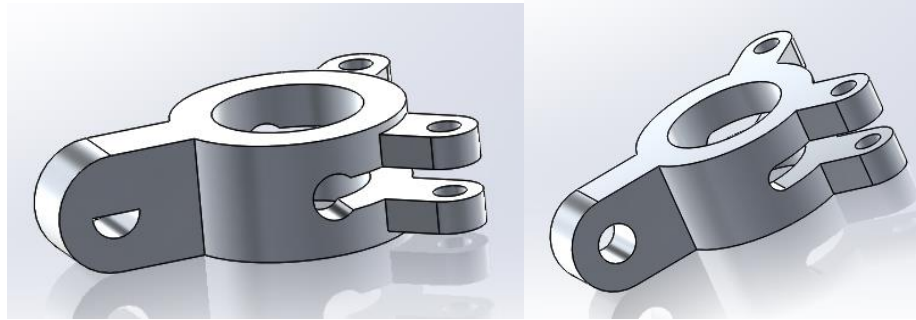


Figure 26 Error model (Left) and desired model (Right) [P2.2_Equation_No2.SLDPRT](#)

In this case, let’s add additional global variables (X and Y) as shown below:

Name	Value / Equation	Evaluates to	Comments
Global Variables			
"A"	= 45	45	
"B"	= 70	70	
"C"	= 36	36	
"D"	= 45	45	angle
"X"	= "B" / 2	35	
"Y"	= ("C" - 10) / 2	13	

Figure 27 Setup additional global variables

Assign those additional global variables in **step 2** and **step 3** profiles. Then, rebuild again. Now you can get the exact model and its mass will be **308.31grams**.

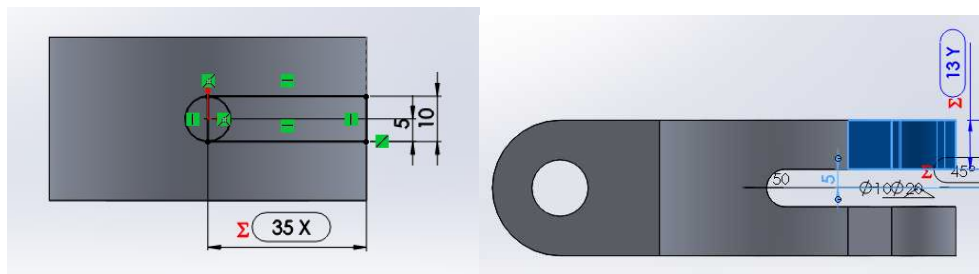


Figure 28 Additional global variables (X and Y) assignment

Interpretation of Drawings

The drawings provided in the CSWP exam follow several rules, in many respects to the standard of mechanical drawing. So, learning the basic concepts of the mechanical drawing

will help you read the drawings, extract the correct information, and create a correct model during the CSWP test. This chapter is intended to provide the reader with the basic knowledge needed for the CSWP exam and for those who have no experience with reading mechanical drawings. If you are experienced users of SOLIDWORKS, skimming this chapter would be sufficient for this part.

Orthographic projection

Information about parts is provided through an **orthographic view**. Views in the CSWP exam don't seem to follow a particular format, and they usually tend to provide an orthographic view which is the easiest to understand the parts. **International standard ISO** centered in Europe applies **First angle projection**, while **US standard** centered in the US uses **Third angle projection**. The principal view is the view having the most part information. All the views on the sheet must be related. Each view is projected from another view. A view cannot be positioned randomly on the drawing sheet. Since most CSWP problems provide isometric views, visualization using the projected views and isometric views into three-dimensional shapes in your mind can help reduce mistakes in the modeling.

Generally, the third angle projection would be more intuitive and easier to understand. Also, it is used mainly in the US, the CSWP tends to use a third angle projection method in their problems. In the drawing property of SOLIDWORKS, there is an option to select the first angle and third angle.

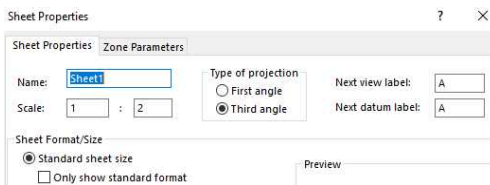


Figure 29 Sheet properties Projection option

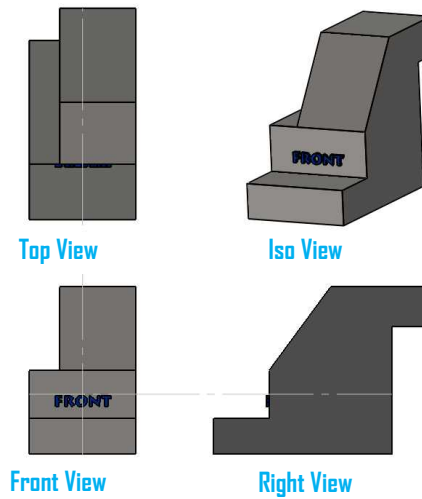


Figure 30 ANSI Orthographic Projection-Third Angle Projection (US) [P2.2_OrthoView_1.SLDPRT and.SLDDRW](#)

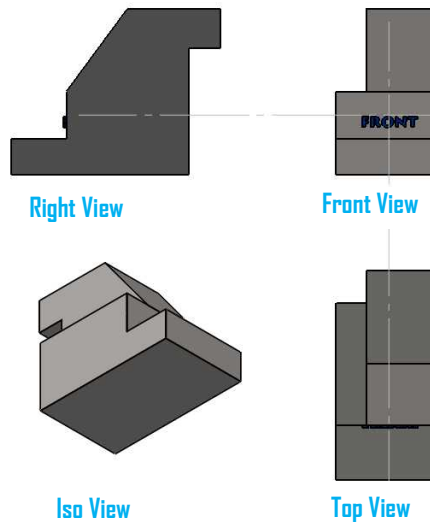


Figure 31 ISO Orthographic Projection-First Angle Projection (International) [P2.2_OrthoView_2.SLDDRW](#)

The following figures will be used to show the concept of multi-view drawings based on orthographic projection principles: The top view must be vertically aligned with the front view. In general, the standard 3 views are provided as problem information. In the case of simple geometry, 2 views could be provided.

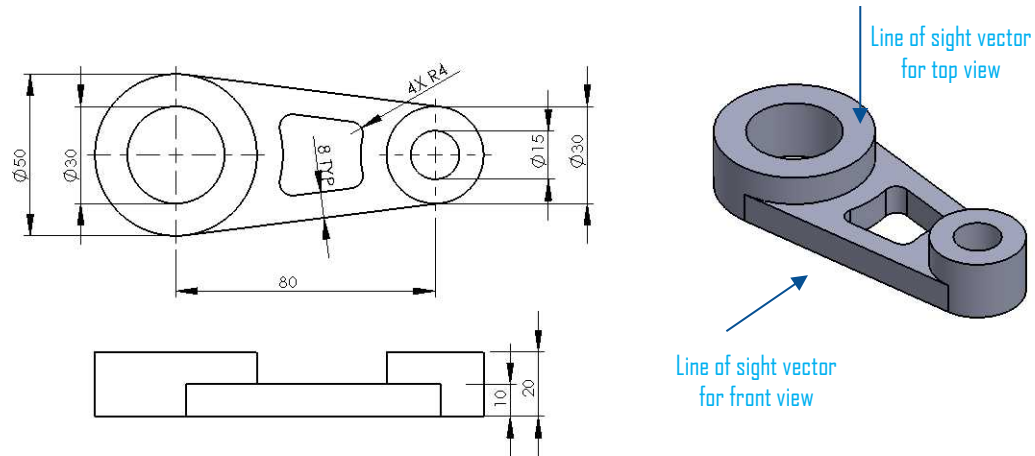


Figure 32 Two view representation of Pivot Arm P2.2_OrthoView_3.SLDPRT

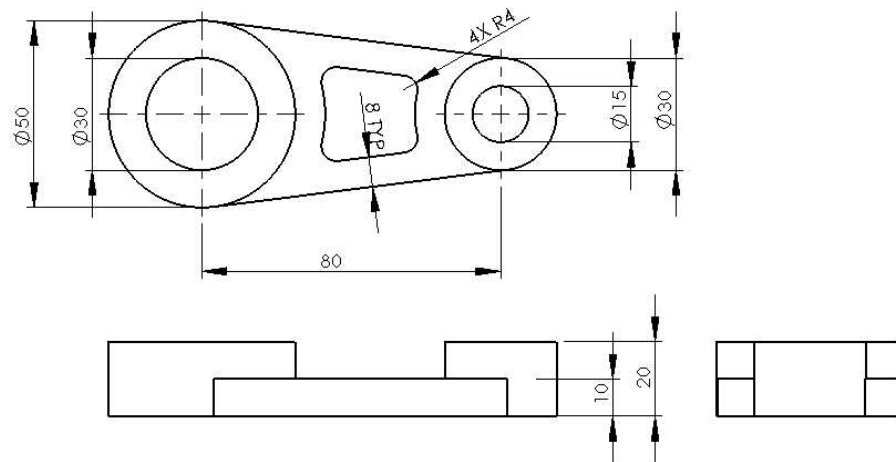


Figure 33 Three view representation of Pivot Arm

Sometimes a **Symmetric part** would be tricky to model. If you understand the characteristics of symmetry immediately, modeling can be effective. A symmetry line in the center of the part with the "CL" mark attached. If the part is symmetrical in both axis "X" and "Y", two symmetry lines should be drawn with the "CL" mark attached to each of them.

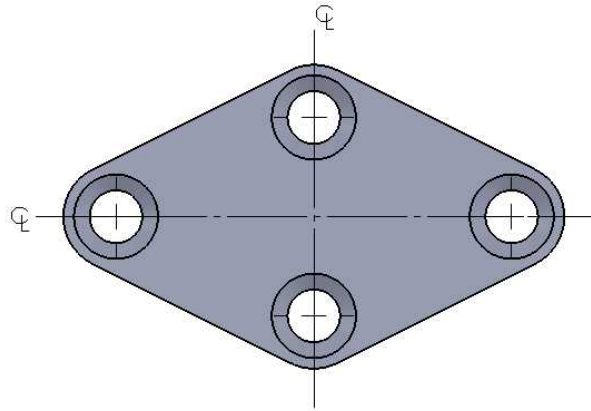


Figure 34 Symmetry model [P2.2_Symmetry_1.SLDPRT](#)

Section views are often included in the problem, so you need to understand the exact meaning. The section view is created by cutting the part and removing the cut area to show the form and structure of the cut plane. Sectioned views, which are standard orthographic views, are used to make hidden part features, which would otherwise have to be shown in hidden lines, fully visible in a particular view.

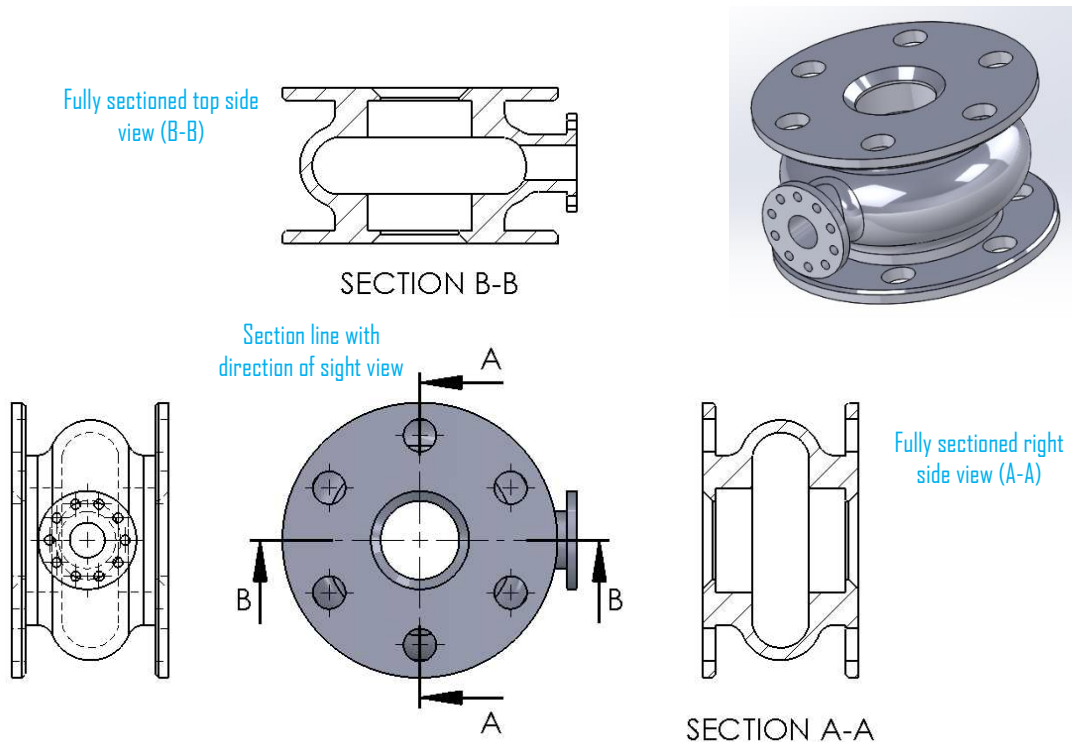


Figure 35 Section view comparison [P2.2_SectionView_1.SLDPRT](#)

A **Detail View** is used to magnify part of a projected view or a section view to clearly see the relevant detail in the drawing. The Detail view is labeled as follows:

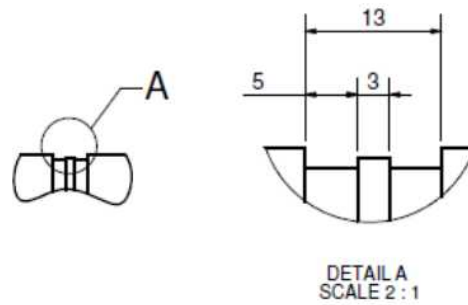


Figure 36 Detailed view example

Dimensioning

Dimensioning has a basic rule of standard. The CSWP follows these principles. Dimensions and other notes on the drawings are often referred to as “call-outs”. Most dimensions are easy to read without professional training. However, in the CSWP exam, sometimes mistakes are made while reading the dimension that results in the wrong answer. Let's find out what the dimension rules are and what the common mistakes are.

- **Do not dimension hidden lines!**
- **Do not dimension a feature twice in the same drawing.**

A dimension should appear only once, but if the dimension required for better understanding, the dimension will be marked with parenthesis

- **A feature dimension will be given in the same view where the feature is most clearly visible**
- **The dimension lines shouldn't cross each other.**

In cases where several dimensions need to be given on the same part side, the smallest dimension will be closest to the part body and the largest dimension will be far.

- **Dimension positioning:**

The dimension will be drawn as close as possible to the middle of the dimension line, and above it. The dimension will be drawn parallel to the dimension line (horizontal or vertical) except for drill holes/threads dimensions, where the dimension will be always horizontal. Dimensions should not be positioned inside the part body area, but should be positioned outside of it, with the use of the dimension lines as shown below:

- **If dimensions are preceded by, for example, “2 x” (R17.00), that means that the radius of 17.00 units occurs twice**

The next image shows the drawing created following the rules of the above dimension rules. Create the part based on the drawing and select 1060 Alloy as the material. Then, measure the mass. The mass is **176.15 grams**.

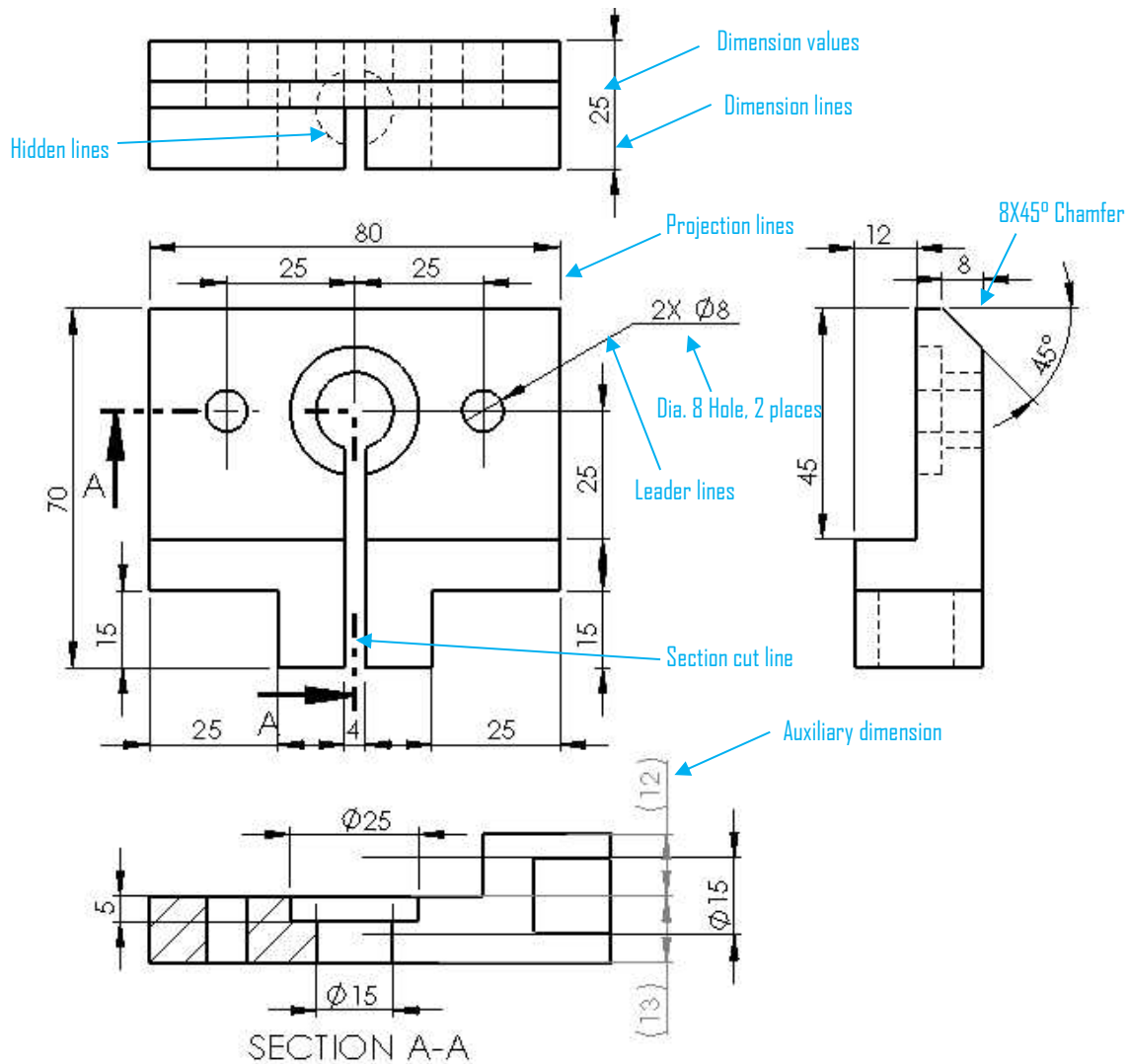


Figure 37 Drawing with dimensions P2.2_Dimensions_1.SLDPRT

Dimension lines have various types of terminators and a single type should be used in a drawing. Segment 3 generally uses the terminator having a solid-arrow shape. When using a running dimension, the Origin indicator is also used, but the CSWP rarely uses a running dimension as well as an origin indicator.

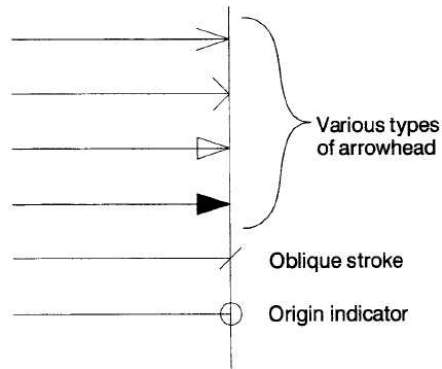


Figure 38 Various types of dimension line termination

Parallel dimensioning vs. Chain dimensioning

There are three types of dimension display. Basically, running and parallel dimensioning are identical methods, while Chain dimensioning is an entirely different dimensioning methodology. In general, most CSWP problems used the combined dimensioning includes chain dimension and a parallel dimension. Exam takers should be careful with these dimension methods.

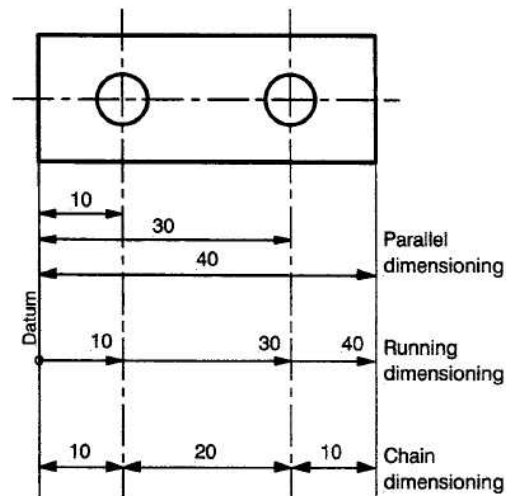


Figure 39 Parallel, Running, and Chain dimensioning

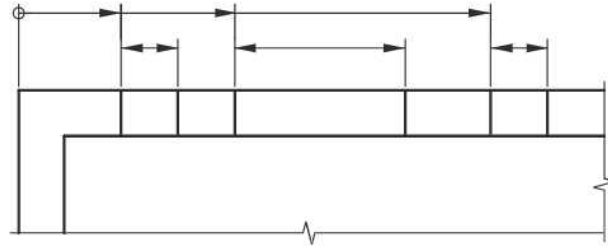


Figure 40 Combined dimensioning

If the drawing applies parallel dimensions, you should use the identical parallel dimensions during the sketch. Likewise, a part drawn with a chain dimension must apply the chain dimension in the sketch or feature task. The results of the model may be the same, but there will be a problem in the following modification questions because the results may be different if those dimensions are associated with the linked value.

In case of that the problem drawing is provided with linked values as shown below (A), the result of A and B should be the same even though task takers used different dimensioning methods. However, in the following example, if the problem of modifying the model by updating the linked value from 5mm $\rightarrow$ 8mm comes out, the result will be different as shown below. Thus, **“Just sketch as what drawing said. Don’t calculate anything”**

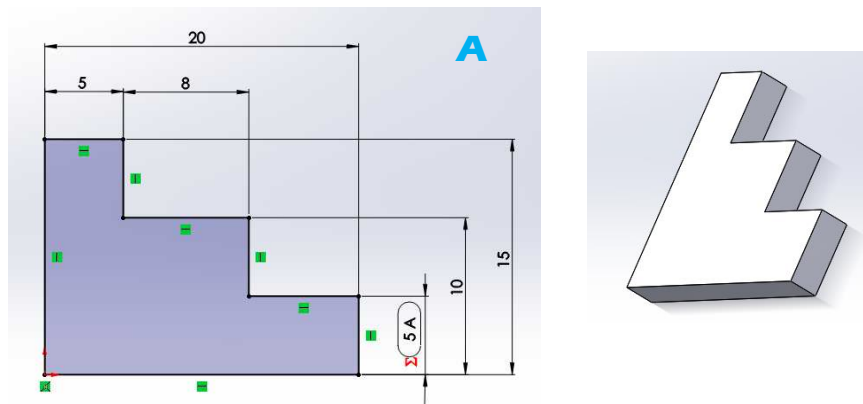
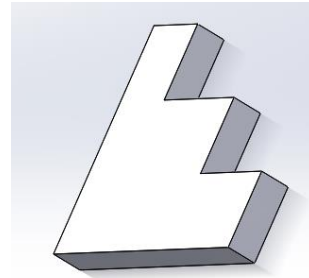
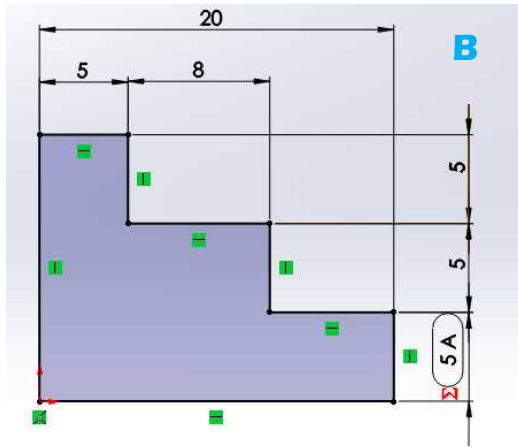
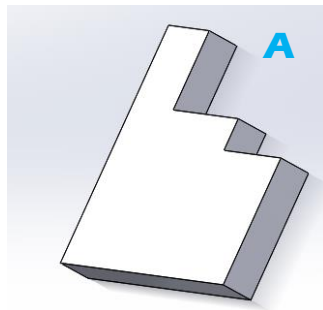


Figure 41 Example of Dimension Mistake (Exam drawing presents parallel dimension)

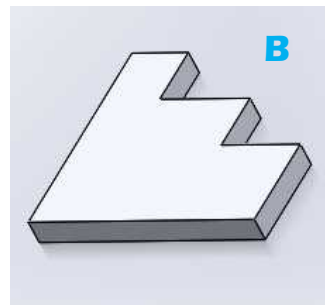


Wrong case of dimensioning (Chain dimension)

► When linked value A changed from 5mm to 8mm, then result showed as follows:



Correct Answer



Wrong Answer

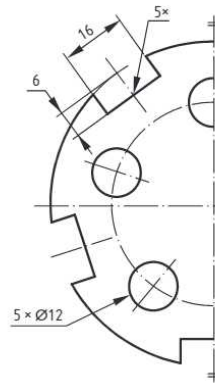


Figure 42 Circular spacing dimensioning

One should use the method given below to add dimensions for equally spaced features. If there is a chance of misinterpretation, one needs to indicate which one out of the two refers to the distance

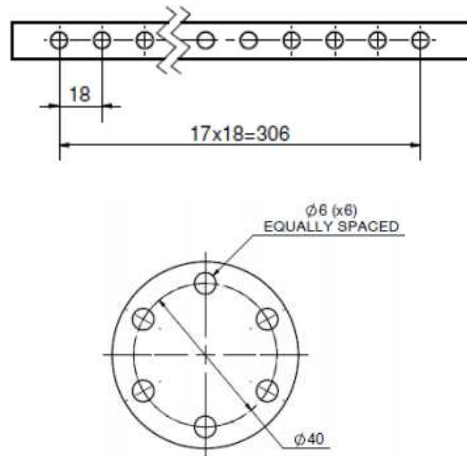


Figure 43 Equally spaced dimensioning

The use of "TYP." notation will be made only for repetitive fillet or for chamfer (this is not applicable for drill holes). The notation will be highlighted in capital letters and placed underneath the dimension. Alternately, the number of fillets or chamfers can be counted and notate accordingly.

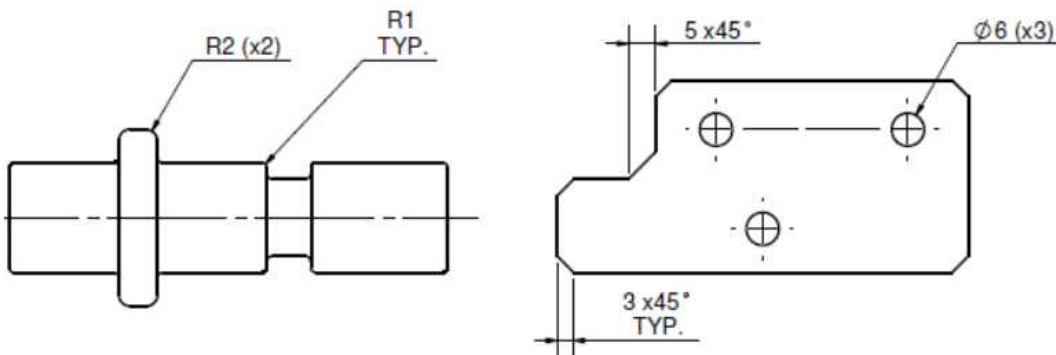


Figure 44 'TYP' annotation in dimensioning

Symbols

While working in SOLIDWORKS, Various symbols appear in the drawings. Most of them are intuitively understandable, but some are not. Let's look at the primary symbols that appear in a general mechanical drawing:

SYMBOL	CHARACTERISTICS	CATEGORY
	Straightness	Form
	Flatness	
	Circularity	
	Cylindricity	
	Profile of a Line	Profile
	Profile of Surface	
	Angularity	Orientation
	Perpendicularity	
	Parallelism	
	Position	Location
	Concentricity	
	Symmetry	
	Circular Runout	Runout
	Total Runout	

Figure 45 Mechanical drawing symbols

Hands-On Practice Drawing Interpretation #1

- Practice time: 15 min
- Unit: MMGS (decimal digit 2)
- Material: 1060 Alloy
- Key points
 - Create Part based on the provided drawing.
- Measured mass: 268.68 grams

* Note: all fillet has R=3mm

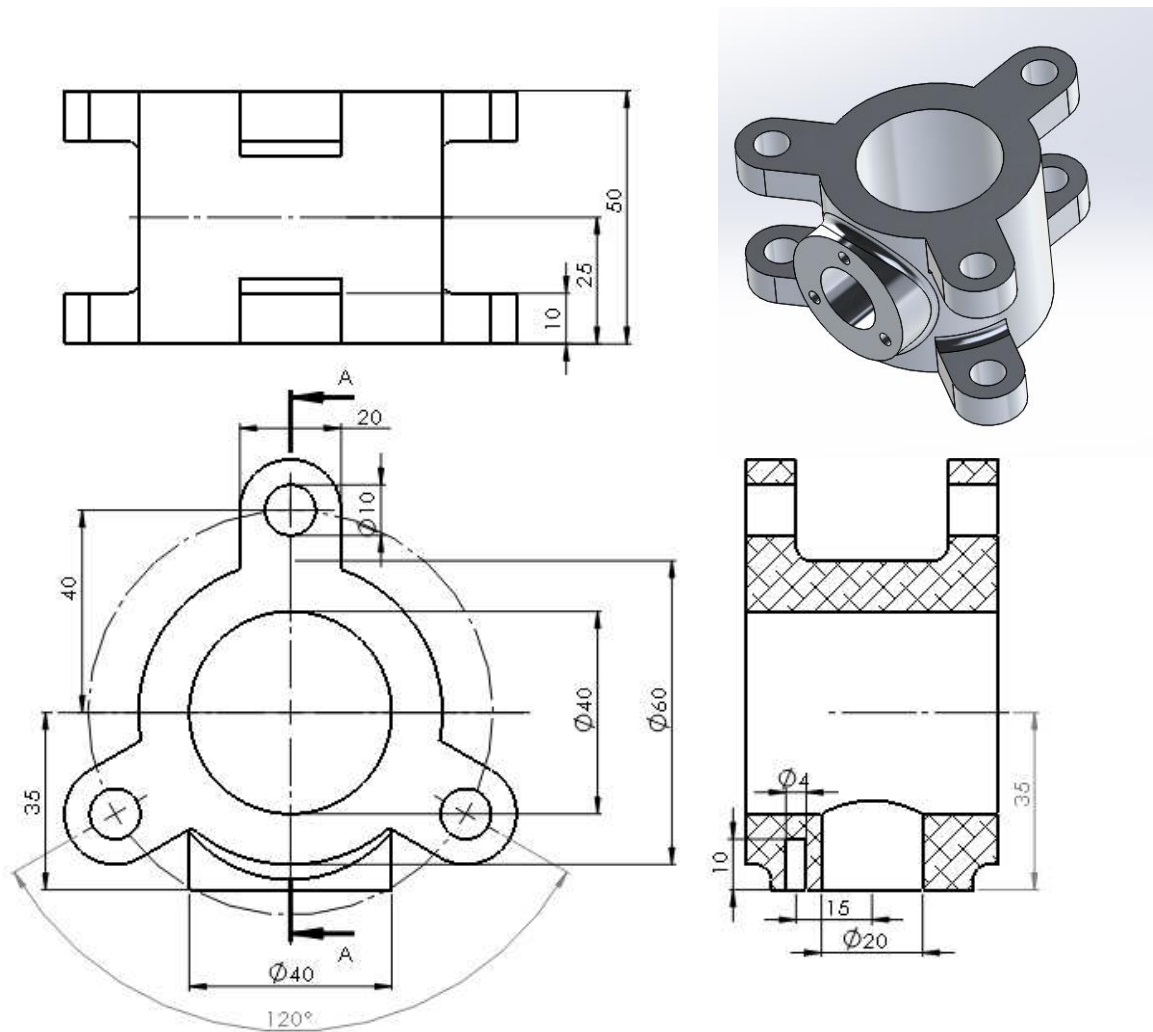


Figure 46 Drawing interpretation practice [P2.2_DrawingInterpretation_1.SLDPRT](#)

Hands-On Practice Drawing Interpretation #2

- Practice time: 20 min
- Unit: MMGS (decimal digit 2)
- Material: Nickel
- Key points
- Create Part based on the provided drawing.
- Measured mass: 223.63 grams

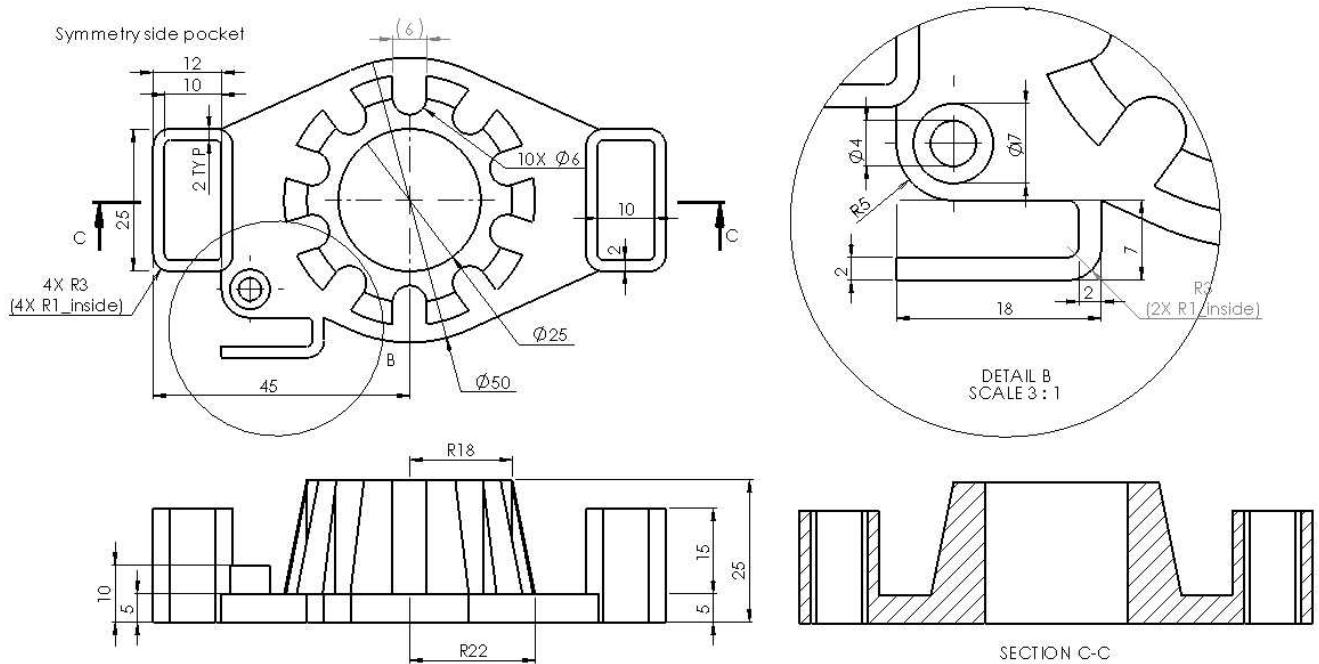
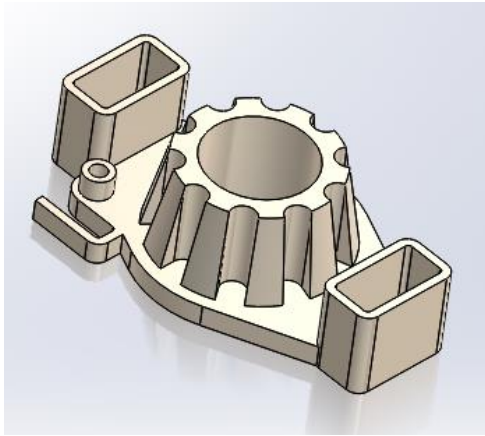


Figure 47 Drawing interpretation practice  P2.2_DrawingInterpretation_2.SLDPRT

Common Mistakes

Here are some common mistakes often made in Segment1.

1. Lack of time

Speedy modeling is critical throughout the CSWP exam. It needs to practice 3D part modeling to enhance speed. Also, using the shortcut, hotkeys and mouse gesture will help you save modeling time. If an error occurs during the part modeling, and you have to spend some time to find and fix it, then its highly likely for you to fail. To increase the speed to complete, it gives your best and practice only. There are many examples of 3D modeling training in this book, so please train thoroughly.

2. Dimensioning mistakes

As mentioned many times before, dimensioning is one of the most important factors for creating an accurate model. It is important to look thoroughly at the drawings provided in the problem, find the appropriate origin, and model them based only on the dimensions provided in the drawings. Confusion between chain dimensions and parallel dimensions is one of the most common mistakes. Never do dimension by calculating dimension in your mind, just follow what drawing said.

After completing the sketch, you have to make sure it has fully defined sketches always if the sketch is blue, if a minus sign appears next to the sketch name in the feature tree, or if the bottom right-hand corner it says under defined, you have to go back to the sketch to fix them.

3. Fillet and Chamfer missing out

If you can't find the exact value due to a slight offset in the multiple-choice problem, the fillet or chamfer is likely missing out. In particular, chamfer has 45 degrees default value, but sometimes drawing uses 30 degrees or 60 degrees. Be careful with that.

In the modeling process, it is also a good tip to colorize those fillet and chamfer by applying a red or blue color. It will be helpful when you are reviewing your model to find if something is wrong with fillet and chamfer.

4. Mistakes in geometric relation

During the sketching process, SOLIDWORKS creates auto geometric relations. Because of this, unintended geometric relations can cause errors in models that are having update problems. Check the below sketch. It looks okay and it seems every line is fully defined and dimensions are correctly applied. Also, you might get very close answer values. However, if the update parameter problem follows you might get the wrong answer. Look carefully at the sketch again. It can be seen that the two edges adjacent to the circle have different geometric relations (coincident and tangent) set automatically. When sketching, we have to be careful with the automatically created geometric relations that you don't even know.

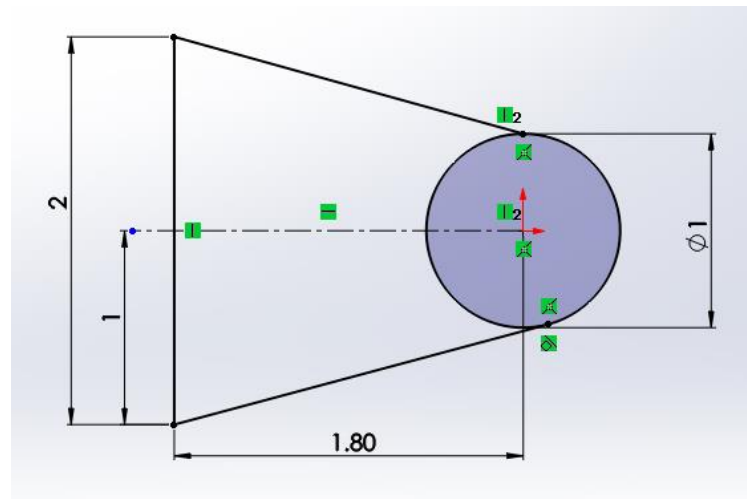


Figure 48 Example of unintended geometric relations

5. Select proper origin and sketch plane

Generally, selecting an origin is considered a non-critical entity during part modeling. However, segment 1 deals with the updating parameters with maintaining design intent. Therefore, even though the origin is often said to be arbitrary in the instructions, selecting it with design intent helps future updates. Selecting a proper sketch plane is a simple task since the problem instruction provides orthographic projected views. Selecting the sketch plane to match the provided orthographic view will help to reduce related mistakes. If you are starting with the top view from the drawing, then select **Top Plane** for the sketch.

The most important thing about goal is
Having One

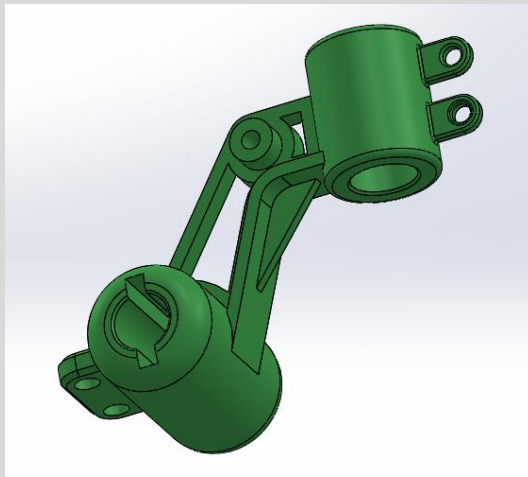


Forest House, created by the author 2019
SOLIDWORKS modeling with architectural rendering

2.3 Walkthrough: Practice Exam Set 1

Exam Set 1 [Segment 1]

Certified SolidWorks Professional CSWP Segment 1 Test



- Segment 1 Parts
 - Create sketches
 - Use linked values and equations
 - Create solid model
 - Measure the mass of the part
 - Modify the features
- Test duration: 90 min
- Total points: 155 points
- Total Questions: 6
- Pass score: 85

[Start Examination>](#)

CSWPR4 Segment 1: Examination Information

Examination Information

Welcome to Segment 1 of the CSWP Core Exam

- This test is made up of a series of problems broken down into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set.
- You must use at least SolidWorks 2008 for this exam. Any use of a previous version will result in the inability to open some of the testing files.
- Your exam is: 6 questions.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have 90 minutes to complete this examination.
- Minimum passing score is: 85 points.
- Your proctor is: Virtual Tester Online

Press the Start Examination button to continue.

Start Examination

Question 1 of 6

For 0 point:

This text describes the questions that must be solved in this problem set

You will be creating a part using the drawings and parameters specified in the following questions. Later you will modify your part using design changes given to you.

You will be asked to do the followings:

- Create initial sketches and parameters
- Create and use linked dimensional values and equations
- Create your solid model using various features
- Measure the mass of your finished part
- Modify existing parameters
- Modify the geometry of the base part to create a more advanced part

HINT #1

The dimensions that are to be linked or updated and are variable will be labelled with letters. Any dimensions that are simple value changes from one stage to another will be circled in the images.

HINT #2

To save the most time, make use of linked dimensional values and equations

Continue?

Yes

Continue

Question 2 of 6

For 25 point:

Initial part creation

Build this part in SolidWorks

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Alloy Steel

Density: 0.0077g/mm³

- All holes through all unless shown otherwise.
- Use the following parameters and equations which correspond to the dimensions labelled in the images

A=80mm

B=185mm

C=100mm

D=120mm

E=50mm

Y=A/2+10mm

- Measure the mass of the part.

What is the mass of the part (grams)?

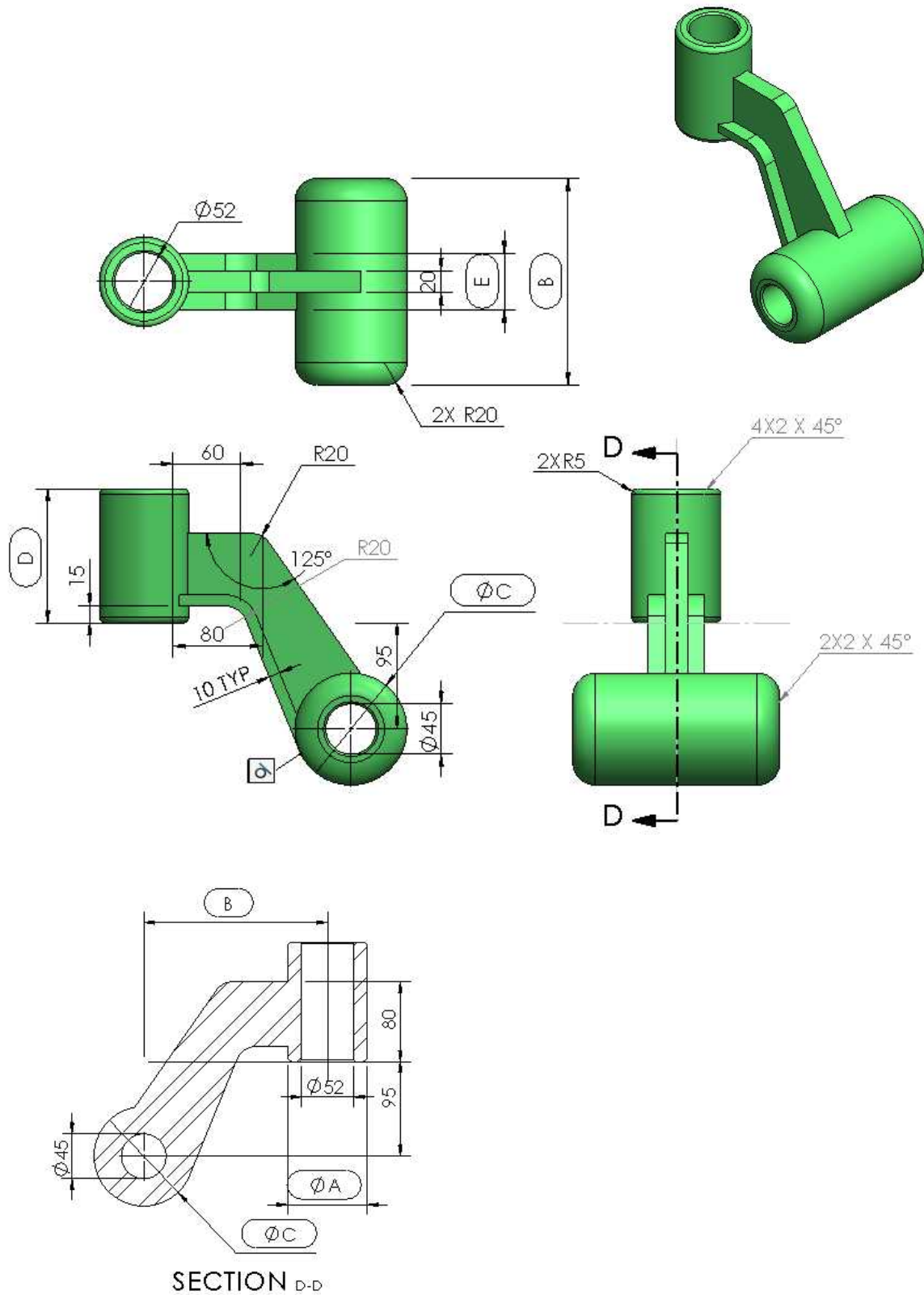
☐ 12856.25

☐ 13372.36

☐ 13371.57

☐ 13455.69

Reference Image for Q2 of Exam Set 1 >>



Question 3 of 6

For 20 point:

Update parameters of the initial part

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Alloy Steel

Density: 0.0077g/mm³

- All holes through all unless shown otherwise.
- Use the following parameters and equations which correspond to the dimensions labelled in the images

A=76mm

B=185mm

C=125mm

D=135mm

E=43mm

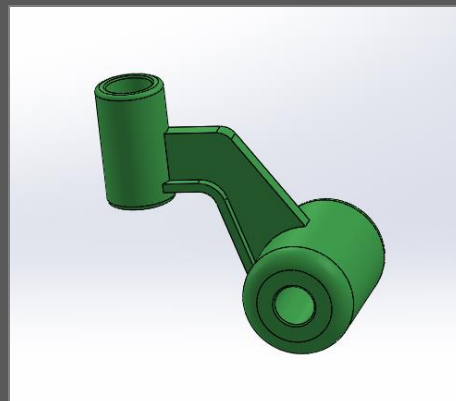
Y=A/2+5mm

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter value:

(Use . as decimal point, 2 decimal places)



Question 4 of 6

For 20 point:

Modify and add features

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Alloy Steel

Density: 0.0077g/mm³

- All holes through all unless shown otherwise.
- This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA, BB, and CC shown in the image.
- Use the following parameters and equations which correspond to the dimensions labelled in the images.

*Note: the changes in equation for variable Y

A=80mm

B=185mm

C=100mm

D=120mm

Y=A/2+10mm

F=Hole wizard standard: ISO

Type: Hex socket CTSK Head ISO 10642

Size: M8

Fit: Normal, through all

- Measure the mass of the part.

What the mass of the part (grams)?

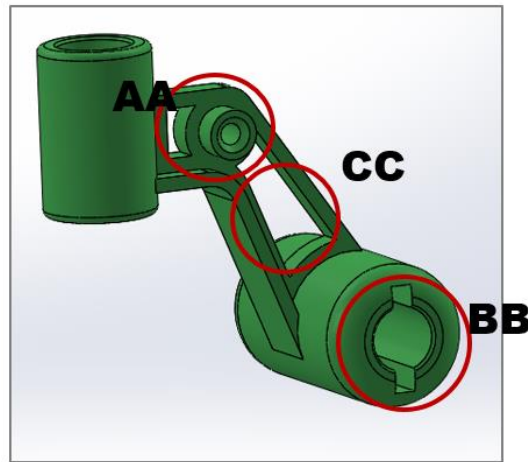
☐ 13292.65

☐ 12434.44

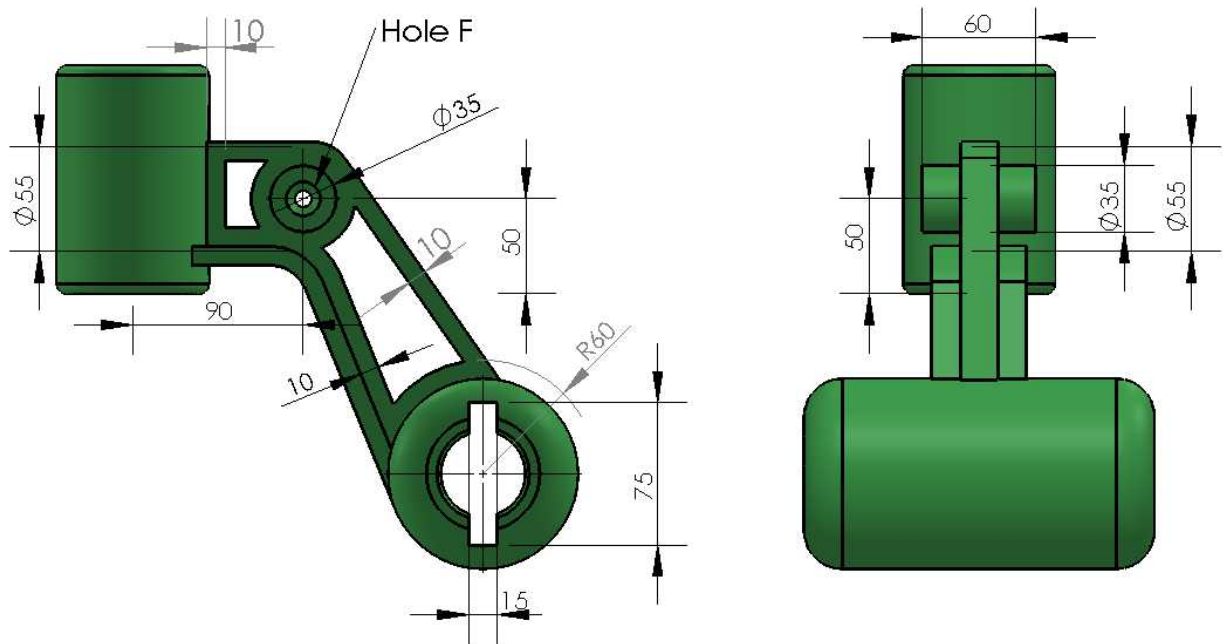
☐ 14218.36

☐ 12452.14

Reference Image for Q4 of Exam Set 1 >>



ISO view



Question 5 of 6

For 25 point:

Modify and add features

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

- This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA, BB, and CC shown in the image.

- Use the following parameters and equations which correspond to the dimensions labelled in the images

*Note: the change in material.

A=90mm

B=180mm

C=100mm

D=110mm

E=A/2+10mm

X=95

Y=A*1.2

F=Hole wizard standard: ISO

Type: Hex socket CTSK Head ISO 10642

Size: M8

Fit: Normal, through all

- Measure the mass of the part.

What the mass of the part?

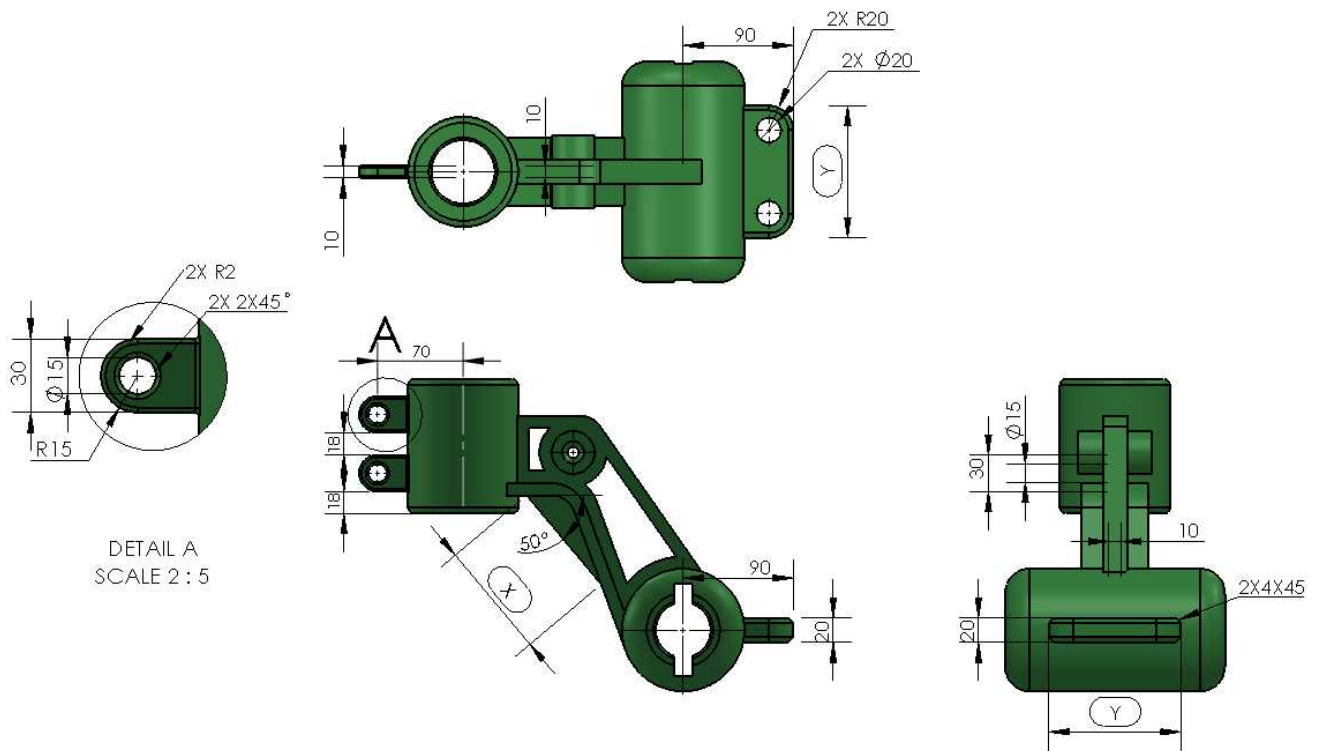
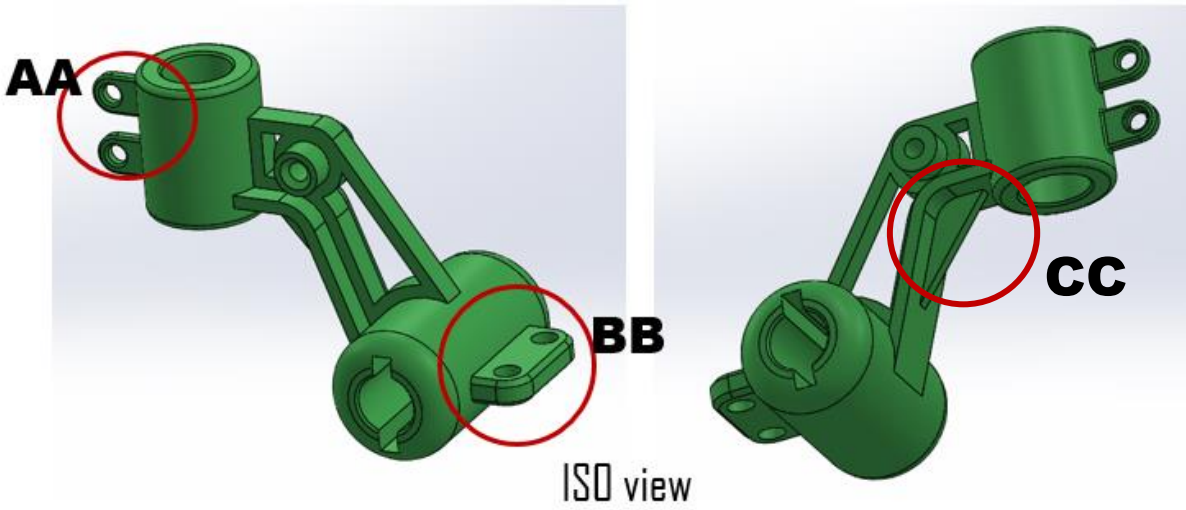
☐ 4870.54

☐ 5012.98

☐ 4759.37

☐ 4858.64

Reference Image for Q5 of Exam Set 1 >>



Question 6 of 6

For 20 point:

Update the parameters :

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-This part is to be modified using the following instructions and parameters.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

A=88mm

B=180mm

C=110mm

D=112mm

E=A/2+8mm

X=85

Y=A*1.0

F=Hole wizard standard: ISO

Type: Hex socket CTSK Head ISO 10642

Size: M8

Fit: Normal, through all

-Measure the mass of the part.

What the mass of the part?

Enter value:

(Use . as decimal point, 2 decimal places)

Answer Sheet

EXAM SET 1

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Initial part creation	25	☐ 13371.57
3	Update parameters	20	19220.95
4	Modify and add features	25	☐ 12434.44
5	Modify and add features	25	☐ 4870.54
6	Update parameters	20	5506.58
	Total	115	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here
While **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

- What's your score?
- Do you finish segment 1 test within 90 minutes? ☐ Yes ☐ No
- Do you pass segment 1 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Understanding drawings
 - ☐ Create initial sketches
 - ☐ Using equations and linked values
 - ☐ Updating features
 - ☐ Modifying parameters
 - ☐ Time management

E N D o f E X A M S E T N o . 1

SEGMENT 1 WALKTHROUGH

PART MODELING

Setup Working Environment

Before beginning the exam: The working folder needs to be created. It should be located conveniently, where you can quickly and easily access the saved files. This segment has 5 questions. The test taker must get **85 points** out of 115 points. When the test starts, the tester taker should look through all the questions. It can be browsed forward and backward without answering each question. This will help you to get the whole picture of the exam and understand design intent. The first question is to create a part based on the provided drawing. The important thing is *‘Don’t use your mind in dimensions, just do modeling exactly as shown in provided drawing and information’*

The success key of this segment is to build a robust and accurate model without mistake, especially in the first modeling process. So, these techniques would be helpful for this:

Design intent – Know what you are going to deal with. Read the question set and understand the model. Take advantage of symmetry, patterns and other geometric constraints to simplify your model.

Variables – Before get into the modeling process, assign global variables and the material properties.

Choose modeling strategy – Don’t panic when you see the drawing. Spend a couple of minutes to choose the best default sketch plane and base profiles.

Building up – Think of Part modeling is as simple as it is. Just create material, remove material and apply features like fillets and chamfers.

Question: Creating Part and Measure the Mass

- Create a Working folder in your desktop pc
- Open SOLIDWORKS and create New 'Part'
- Setup working environment

- Select the unit system icon in the lower-left corner then select the proper unit system designated in the problem statement. Mostly, MMGS with two decimal places is used in the CSWP exam.

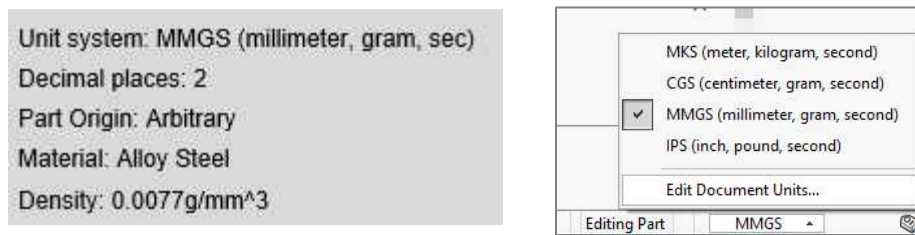


Figure 1 Problem statement and Unit setting

- Click the 'Edit document unit' to setup decimal points and unit systems. In this problem 2 decimal points required to create a part. Select MMGS and .12 in length (mm) dropdown menu in the box.

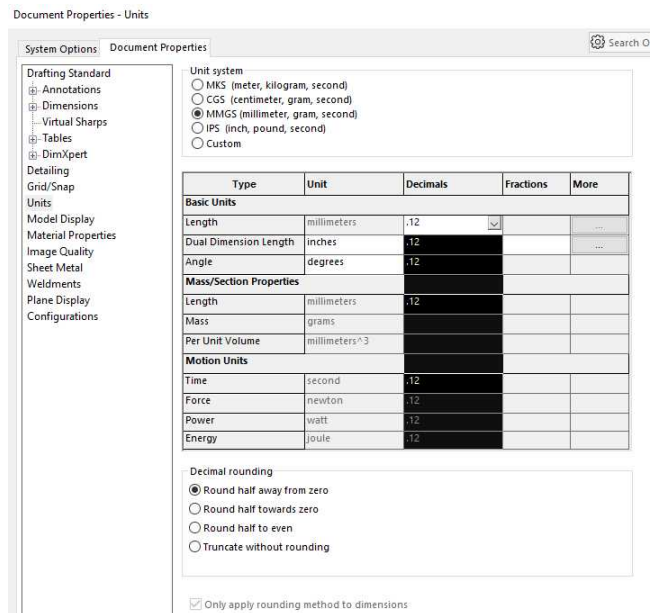


Figure 2 Unit setup dialogue box

The first part creation is really important since the following problems will use the first part model. In most segment 1 problems, the mass is to be verified to ensure that it is modeled correctly. Therefore, the material must be set up correctly. In the problem, **Alloy Steel** is applied, so select **Alloy Steel** from model tree material and check density values. (7700kg/m^3)

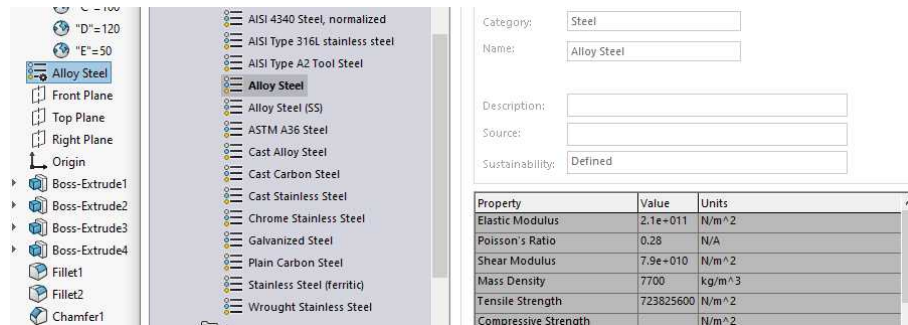


Figure 3 Assign Material Alloy Steel

The first model uses **equations** for parametric modeling, so you should be familiar with the proper use of **equations**. The problem statement uses **five** global values (A, B, C, D, E, and Y), so it is a good idea to set up equations and then proceed to model a part.

A=80mm
B=185mm
C=100mm
D=120mm
E=50mm
Y=A/2+10mm

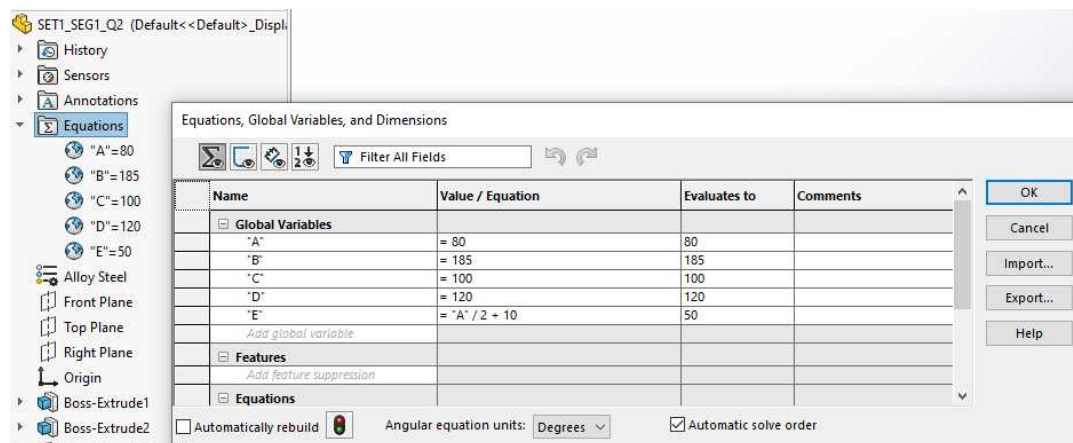


Figure 4 Setup Equations (Global variables: A, B, C, D, and E)

Measuring Mass

The most frequent problem type in Section 1 is the question of mass after modeling or modification. Therefore, effectively measuring the correct mass is one of the basic skills. Mass can be measured after modeling is completed but monitoring how the mass changes during the modeling process. This is also a very useful technique during the process of modifying the model or find an error during the debugging process. There are a couple of ways to check the amount of change in mass while modeling.

The first one is using **Mass property**. It is a method to check mass by clicking mass property whenever you want to check mass. The simplest, but inefficient.

Using the **Sensor** is efficient, so by using it, you can continuously check the mass during the modeling process. You can create a sensor by right-clicking on the sensor in the design tree.

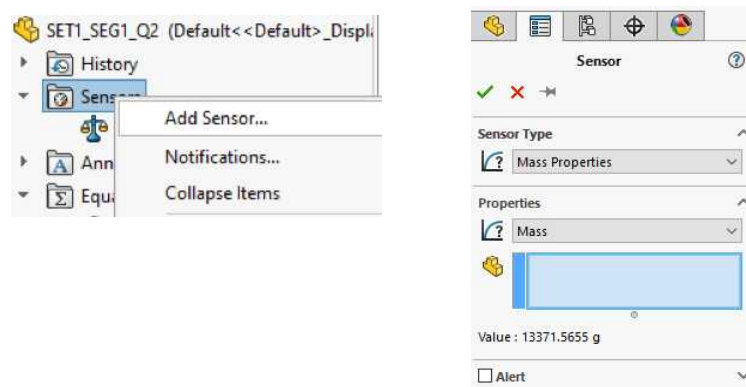


Figure 5 Add Sensor (mass)

Another method is to create a mass property as a **Note** and display it on the screen always while modeling. This is a useful tip if a tester is set up before the real exam.

Select **Insert** → **Annotation** → **Note** to create a new note, and select **Linked to property** from PropertyManager to assign Mass property to the **Note** as shown below. By selecting the **Display annotation** by click RMB in the annotation of the FeatureManager, you can monitor the change in mass on the screen while modeling parts as shown in the figure below.

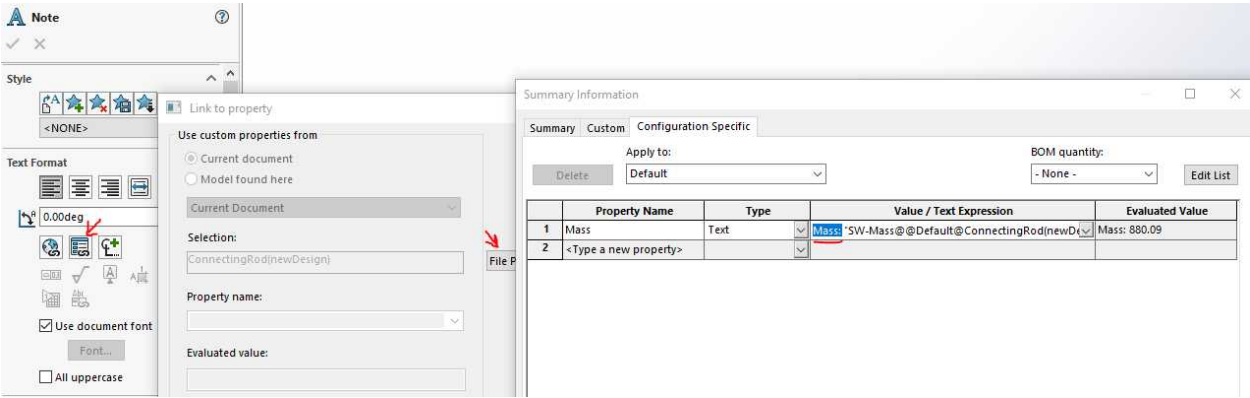


Figure 6 Assign mass property to Note to be displayed

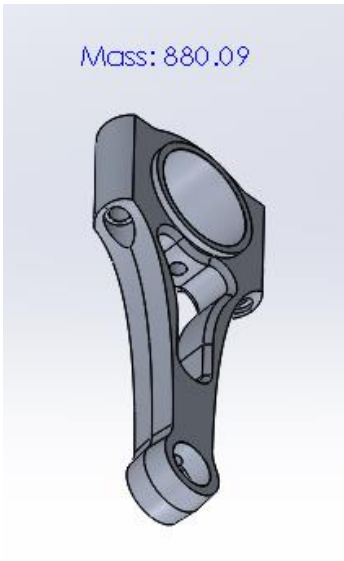


Figure 7 Always-on Mass display

Modeling Strategy

Now it's time to create a model. In general, the first model should be finished within **15 minutes** during 90 min exam length. The latter problems are time-consuming because they will involve more features and complex shapes.

To save time, you need to be fast and effective in modeling. You'll need a lot of practice and training to get hands-on modeling skills. First, you should look at the pictures provided and think about effective part modeling strategies.

In general, the first problem presents a model consisting of about 5 to 6 features. There is no single direct way to create such a model, so training is needed to intuitively identify the most effective methods in a short time. Look at the picture below. Two cylinders are located horizontally and vertically which are connected by a flanged component.

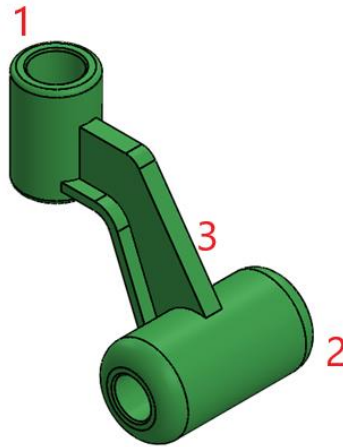


Figure 8 Modeling strategy example – Order of building up features

It would be effective to first create two cylinders and then create the connecting components. It is also important to find the proper origin and sketch plane in modeling. In the figure provided, many dimension lines start at the bottom of the vertically positioned cylinder at the top, so let's start modeling with this as the origin. One more important thing is to pay close attention to what's there in the drawing. Dimensions of a single feature might be spread across multiple views in the drawing. You better check the dimensions of a single feature by reviewing two or more views.

Question #2 Work Process

- Create the sketch for top cylinder and extrude

Sketch two circles as shown below. To apply the global variable to the outer circle, enter '=' in the numeric dimension field and select the previously created **global variable A**.

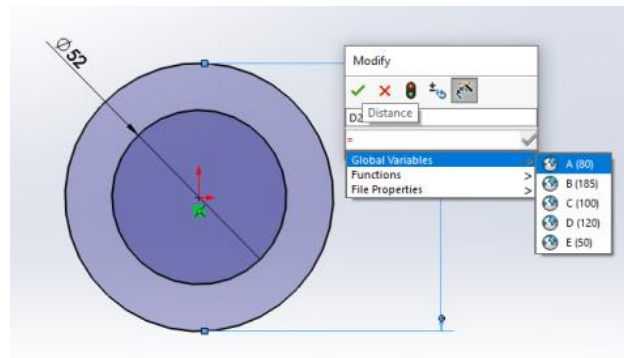


Figure 9 Top cylinder sketch profile

If you enter 'A' and enter a global variable in the dimension text, you can easily recognize that the dimension is using a variable, which can be effortlessly used for subsequent problems.

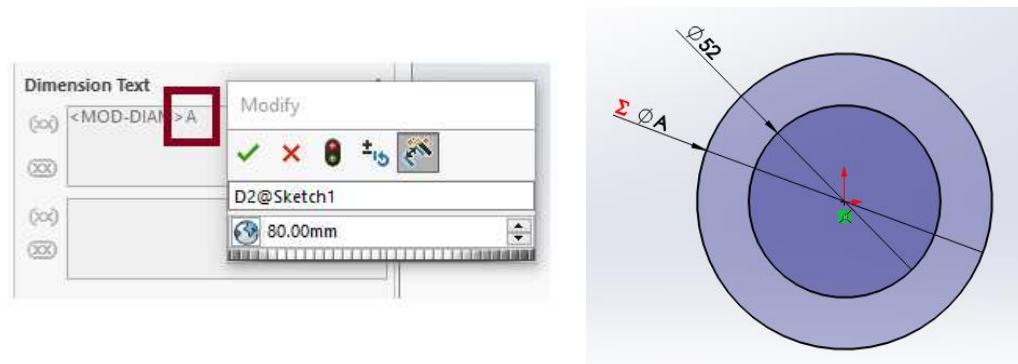


Figure 10 Assign global variable A

Using this generated cylinder profile, the top cylinder is created by extruding 120 mm (**variable D**).

- **Create the sketch for Bottom cylinder and extrude**

In the following approach, the lower cylinder is created. To create the lower cylinder, sketch the cylinder profile on the front plane as shown in the figure and enter the dimension using the global variable. Using this generated cylinder profile, the bottom cylinder is created by extruding 185 mm (**variable B**).

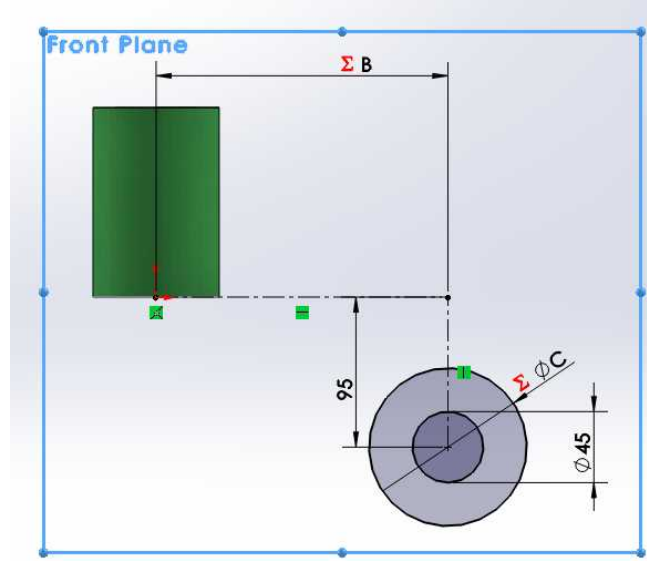


Figure 11 Bottom cylinder profile

- Create the connecting component profiles and extrude

Sketch the profile as shown below using the dimensions of the components connecting the two cylinders. Be careful about tangent constraints.

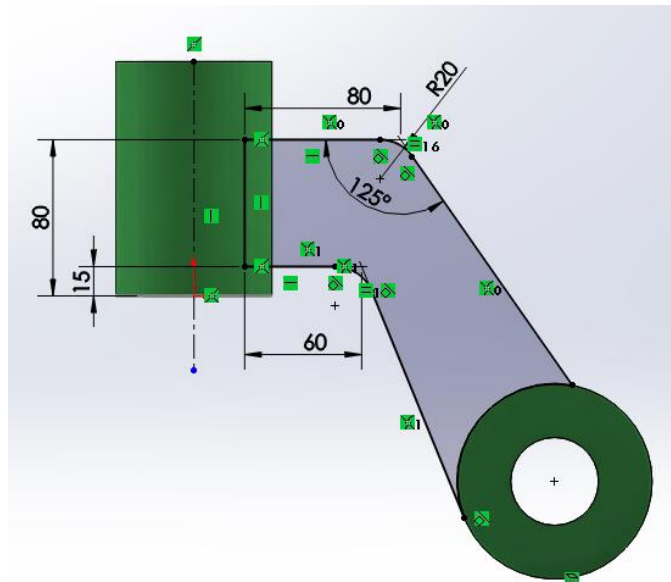


Figure 12 Connecting component profile

At the bottom of the connecting component, create a flange profile on the x-y plane and extrude it to a thickness of 50mm. At this time, if you use the **mid-plane** option to extrude in both directions it can be easily generated flange.

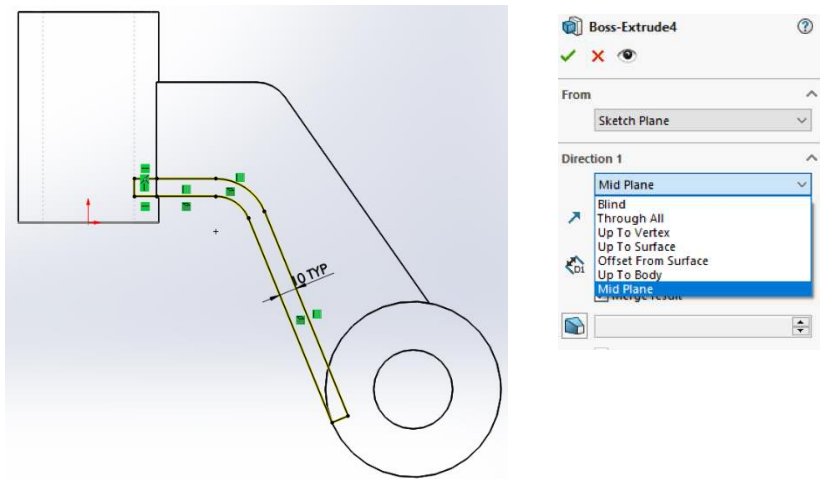


Figure 13 Flange profile

- **Create the fillet and chamfer**

It's a good idea to create fillets and chamfers at a later stage in the modeling process. You can modify this in the following problem since it is necessary to create fillet/chamfer with the exact information provided in the drawing. For example, if 2X4X45 ° is specified in the drawing, two edges with 4mm and 45 ° chamfers must be created at the same time, and if each of the two edges is specified in the drawing as 4X45 °, then each chamfer must be created separately. Using most of the information in the drawings can reduce confusion while working.

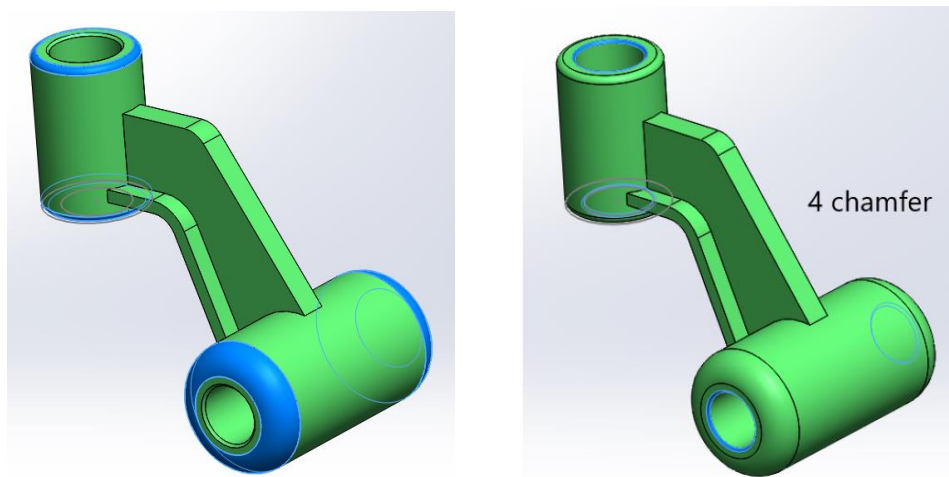


Figure 14 Fillets and Chamfers locations

▪ **Measure the mass of the resulting part**

When you complete a model, save it and use a simple file name to find it easily later such as 'SEG1_Q2'. After saving, it's a good habit to check the mass. There are several ways to check the mass. There is a method to check in the **sensor** as shown below, and another method is to use the **mass property menu** button. The mass of the completed model should be **13371.57gram**. Generally, the actual exam will require accuracy in 2 decimal digit formats if we use the MMGS unit system.

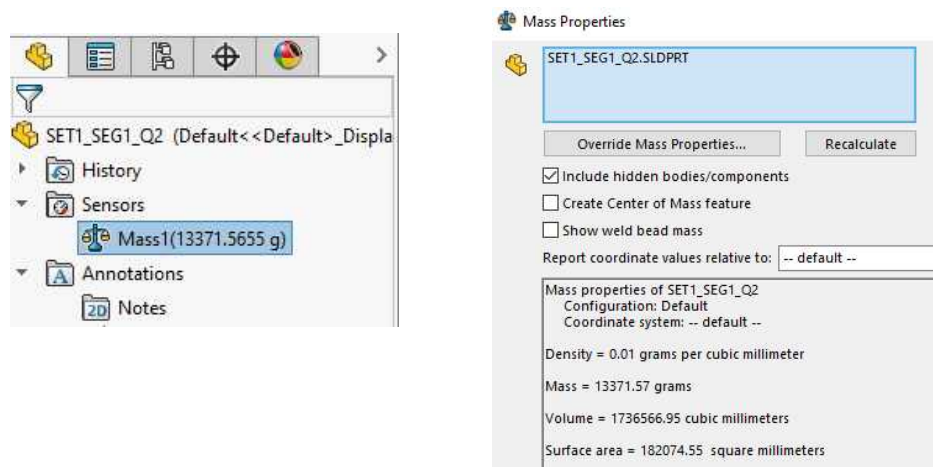


Figure 15 Measuring Mass

TIPS & KNOWHOW

The first modeling problems is **multiple choice format**. It's your friend to give a hint if your models are wrong or not. The multiple choice questions give an instant feedback if you can't find the answer in the list of the choices. If your model's mass is off by more than rounding value, you have to check your model from start to end to find what's wrong in your model. If wrong in the first question, following problems are very likely to be wrong. Typical mistakes are as follows:

- missing the tiny chamfer or fillet edges.
- miss the geometric constraints such as tangent or perpendicular.
- Wrong input in the equations.
- Improper input of Hole Wizard.

Question #3 Work Process

The Q3 problem has an only dimensional change in the equation and it will take only 30 sec to answer.

- **Edit dimensions in the equation box**

Edit the dimensions of the global variables as described in the problem statement. Then, click the '**Rebuild**' button at the bottom of the equation box.

A=76mm
B=185mm
C=125mm
D=135mm
E=43mm
Y=A/2+5mm

▲ [Problem statement](#)

Equations, Global Variables, and Dimensions

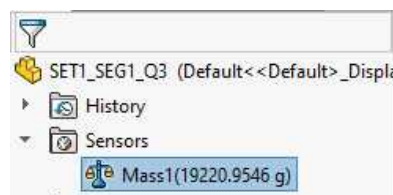
Name	Value / Equation	Evaluates to	Comments
Global Variables			
"A"	= 76	76	
"B"	= 185	185	
"C"	= 125	125	
"D"	= 135	135	
"E"	= "A" / 2 + 5	43	
<i>Add global variable</i>			
Features			
<i>Add feature suppression</i>			
Equations			

☐ Automatically rebuild
 Angular equation units: Degrees
 ☒ Automatic solve order

Figure 16 Edit equations

- **Measure the mass of the resulting part**

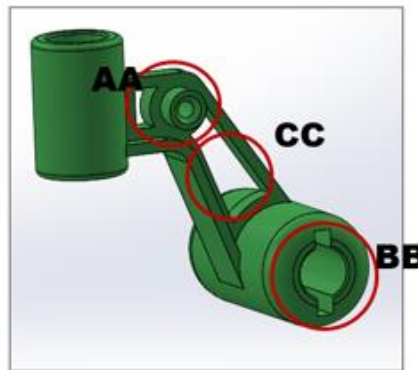
After that, don't forget to save the file. The filename would be '**SEG1_Q3**'. The mass of the resulting part should be **19220.95 grams**. You will not miss this question if your first model is correct.



Question #4 Work Process

Q4 also another multiple-choice format. There will a couple of modifications of the existing features and additional **Hole wizard** usage. You need to be familiar with the Hole Wizard and selecting the correct **center point** with correct hole options.

First, refer to the ISO view of the drawing and draw a picture in your head about how to do this modification task. The problem statement shows three modification features as **AA** / **BB** / **CC**. In general, by following the selecting modification sequence: $AA \rightarrow BB \rightarrow CC$ may lead to the time-saving method. As shown in the figure, the order of creating a **Boss in AA**, then creating a hole with the **Hole Wizard**, creating a **slot in BB**, and creating an internal space with offset option in **CC** seems appropriate.



- **Edit dimensions in the equation box**

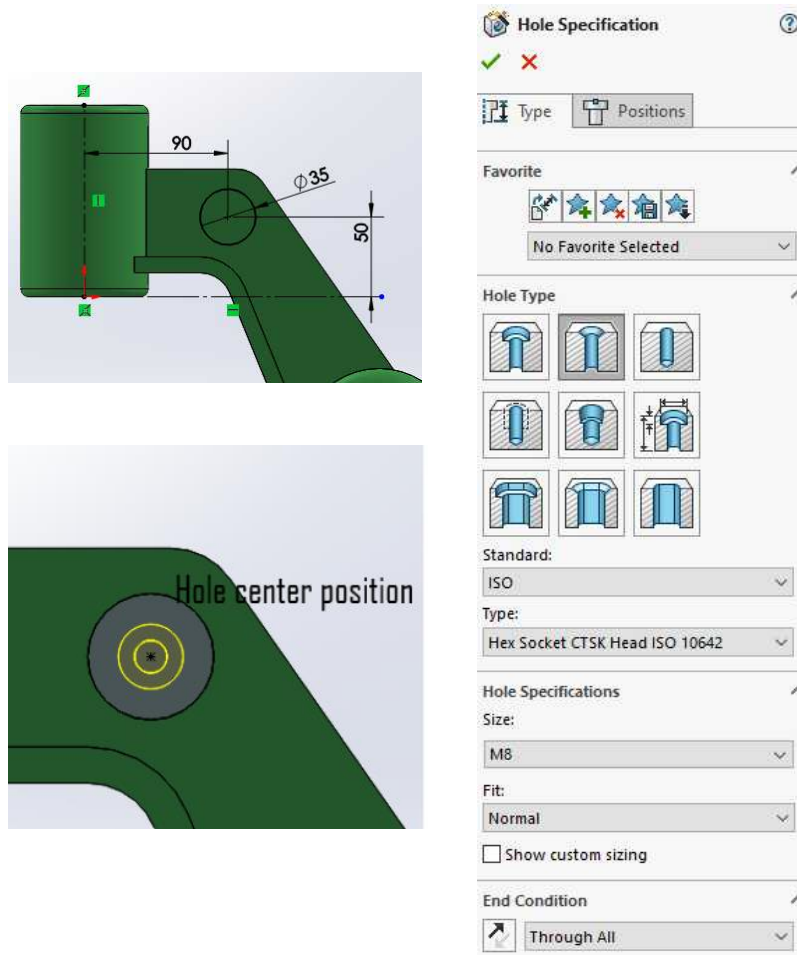
Edit the dimensions of the global variables as described in the problem statement. Then, click the '**Rebuild**' button at the bottom of the equation box.

```
A=80mm
B=185mm
C=100mm
D=120mm
Y=A/2+10mm
F=Hole wizard standard: ISO
  Type: Hex socket CTSK Head ISO 10642
  Size: M8
  Fit: Normal, through all
```

- **Modification of AA**

Create a Boss in the **AA** area and extrude to a thickness of 60mm. Then, use the Hole wizard to create a hole. Likewise, in the previous question, if you create a sketch profile

on the x-y plane, you can easily create a boss using the **midplane** option. Using the **Hole wizard** option, create a hole using the exact information provided in the problem statement. Selecting the correct **hole center position** is very important for reducing mistakes.

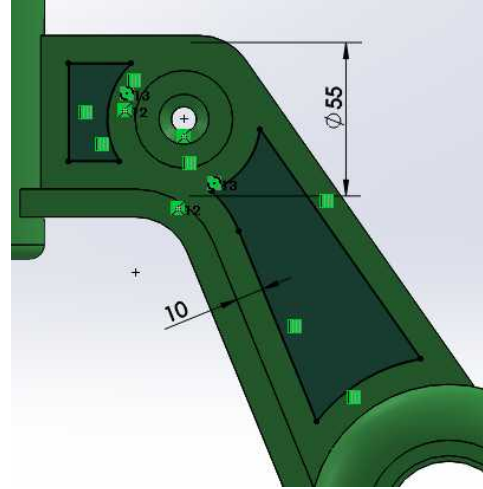
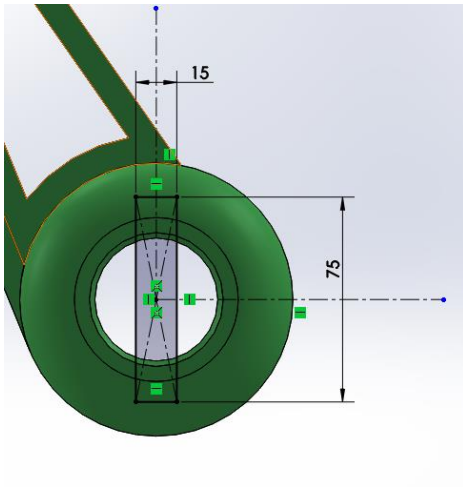


▪ Modification of BB

Modification of the BB site is a relatively easy task. Sketch the rectangle and cut-extrude through-thickness.

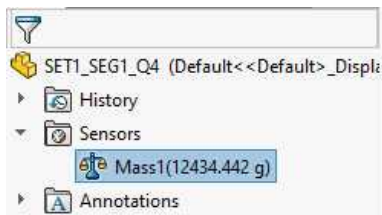
▪ Modification of CC

You better notice that a 10mm smaller profile using **offset** should be created and cut-extruded by observing at the provided drawing. If you don't capture this, you'll spend a lot of time looking for individual dimensions and fail to manage exam time.



- **Measure the mass of the resulting part**

After this step, Don't forget to save the file. The filename would be '**SEG1_Q4**'. The mass of the resulting part is **12434.44 grams**. This question will take more than 15 minutes.



Question #5 Work Process

Question 5 would be the most demanding task through segment 1. It needs to update material properties and add a couple of features including modifying the existing features. It has somewhat complex geometry with tiny fillet and chamfer. Also, a couple of global variables needs to be added to the equation. This makes the problem more complicated. By that time there will not be enough time left out. So, you can feel pressure because the clock runs out. Looking at the drawing can be confusing because you see a lot of tasks, one that needs to be resolved step by step. Once this problem is solved, the remaining problems can be easily completed.

- **Change material to 1060 Alloy.**

Do the simplest task first. Just change the material to 1060 alloy.

- **Edit dimensions in the equation box and create two variables X and Y**

Edit the dimensions of the global variables as described in the problem statement. Add two more global variables X and Y. Then, click the **'Rebuild'** button at the bottom of the equation box.

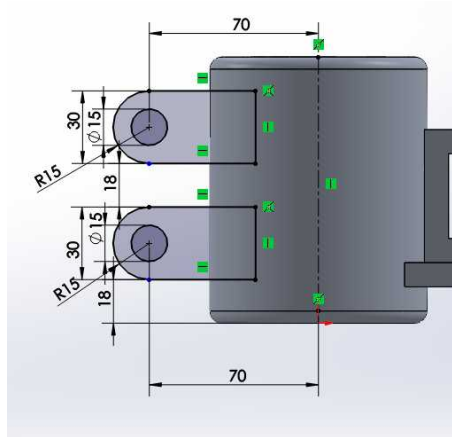
*Note: the changes in material.
 A=90mm
 B=180mm
 C=100mm
 D=110mm
 E=A/2+10mm
 X=95
 Y=A*1.2
 F=Hole wizard standard: ISO
 Type: Hex socket CTSK Head ISO 10642
 Size: M8
 Fit: Normal, through all

Equations, Global Variables, and Dimensions

 Filter All Fields 		
Name	Value / Equation	Evaluates to
☐ Global Variables		
"A"	= 90	90
"B"	= 180	180
"C"	= 100	100
"D"	= 110	110
"E"	= "A" / 2 + 10	55
"X"	= 95	95
"Y"	= "A" * 1.2	108

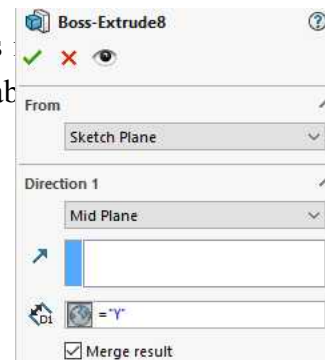
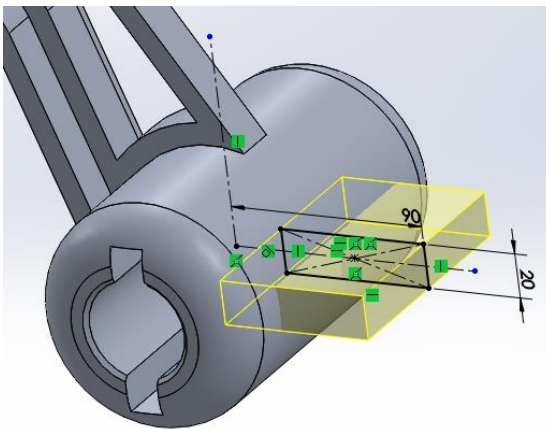
Modification of AA

Create two Lugs with a hole by referring to the drawings. Be careful not to make mistakes while creating Fillet and Chamfer.



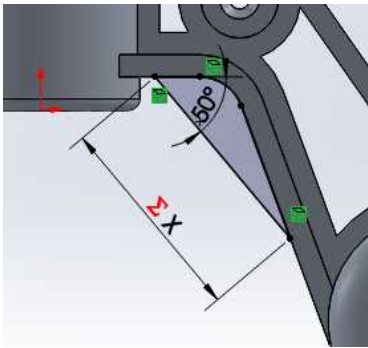
Modification of BB

Like in the AA modification, a lug with two holes cylinder. Enter the dimension using the global variable X the lower part



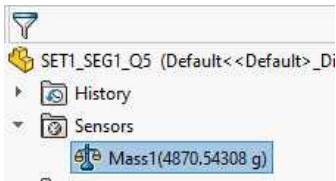
Modification of CC

Create a stiffener at the bottom of the connecting component and enter the dimension using the global variable X .



- Measure the mass of the resulting part

After that, save it. The mass of the resulting part is **4870.54 grams**. This question will take more than 15 minutes.



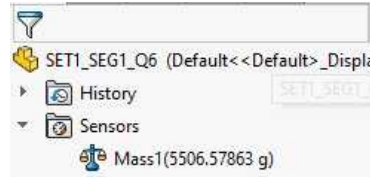
Question #6 Work Process

Just updating the global variables in the equation box. Then you will get the answer easily. The mass of the resulting part is **5506.78 grams**.

A=88mm
B=180mm
C=110mm
D=112mm
E=A/2+8mm
X=85
Y=A*1.0

Equations, Global Variables, and Dimensions

Name	Value / Equation	Evaluates to
Global Variables		
"A"	= 88	88
"B"	= 180	180
"C"	= 110	110
"D"	= 112	112
"E"	= "A" / 2 + 8	52
"X"	= 85	85
"Y"	= "A" * 1.0	88

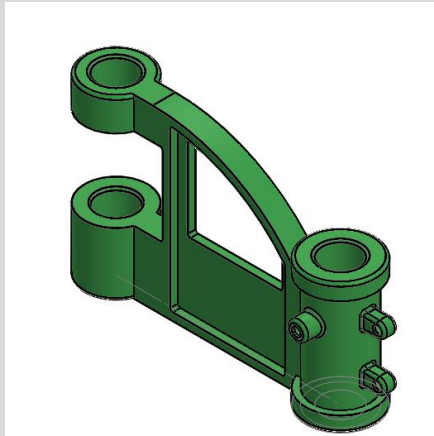


After following the above steps, it's done for the first segment exam. If you have some time remaining, you could check the answers by reviewing them. The multiple-choice questions are worth 75 points. That means you only need 10 points from Fill-in-blanks question to pass. So, if you don't have difficulty finding the correct answer in multiple-choice questions, you will pass the exam easily. If you are not confident in multiple-choice questions, then following the Fill-in-blanks question is likely to be wrong.

2.4 Practice Exam Set 2

Exam Set 2 [Segment 1]

Certified SolidWorks Professional CSWP Segment 1 Test



- Segment 1 Parts
 - Create sketches
 - Use linked values and equations
 - Create solid model
 - Measure the mass of the part
 - Modify the features
- Test duration: 90 min
- Total points: 155 points
- Total Questions: 6
- Pass score: 85

[Start Examination>](#)

Question 1 of 6

EXAM SET 2

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 6 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 90 minutes to complete this examination
- Minimum passing score is 85 out of 115

Press **Start** Examination button to continue.

Start**Question 1.**

This text describes the problem that must be solved in this problem set
You will be creating a part using the drawings and parameters specified in the following questions. Later you will modify your part using design changes given to you.
You will be asked to do the followings.

- Create initial sketches and parameters
- Create and use linked dimensional values and equations
- Create your solid model using various features
- Measure the mass of your finished part
- Modify existing parameters
- Modify the geometry of the base part to create a more advanced part

HINT #1

The dimensions that are to be linked or updated and are variable will be labelled with letters. Any dimensions that are simple value changes from one stage to another will be circled in the images.

HINT #2

To save the most time, make use of linked dimensional values and equations

Please select continue to the next question.

Continue

Question 2 of 6

EXAM SET 2

For 25 points

Initial part creation

Build this part in SolidWorks

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

A=135mm

B=58mm

C=180mm

D=26mm

Y=1.5*B+10mm

-Measure the mass of the part.

(Information is provided in next page)

What is the mass of the part (grams)?

☐ 1415.89

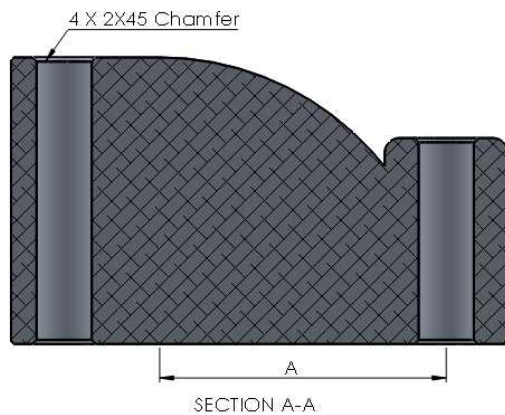
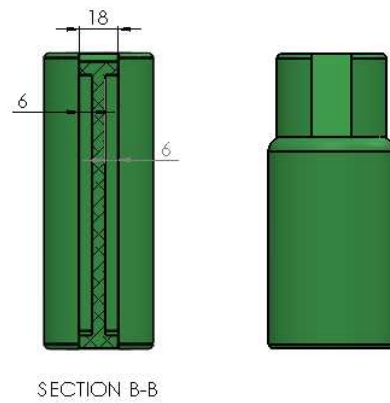
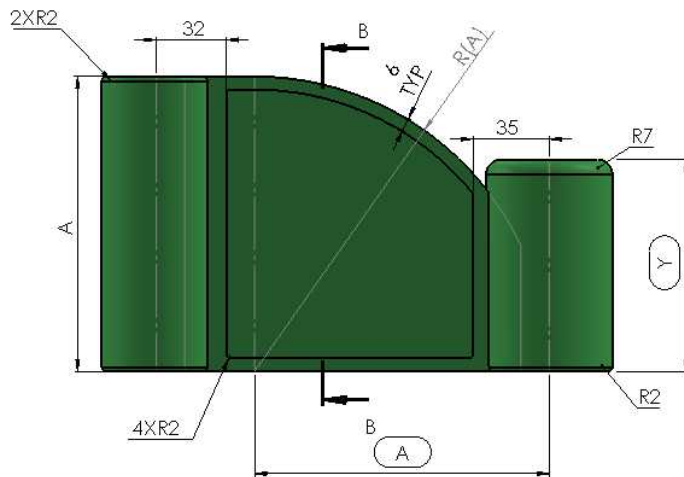
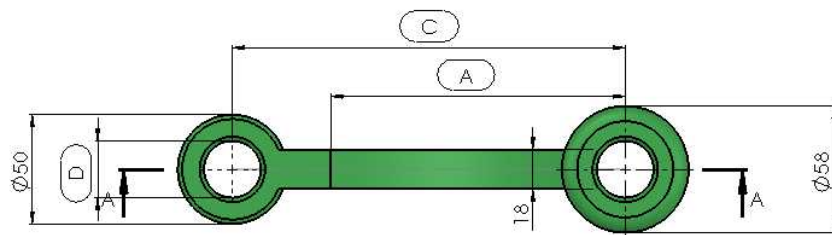
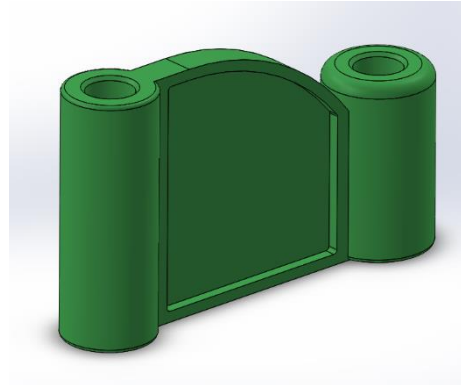
☐ 1455.36

☐ 1426.14

☐ 1414.62

[Next Question >](#)

Reference Image for Q2 of Exam Set 2 >>



Question 3 of 6

EXAM SET 2

For 20 points

Update parameters of the initial part

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy aluminum

Density: 0.0027g/mm³

- All holes through all unless shown otherwise.
- Use the following parameters and equations which correspond to the dimensions labelled in the images

A=143mm

B=58mm

C=190mm

D=26mm

Y=1.5*B+10mm

- Measure the mass of the part

What is the mass of the resultant part (grams)?

Enter Value: []

(Use . as decimal point, 2 decimal places)

[Next Question >](#)

Question 4 of 6

EXAM SET 2

For 25 points

Modify and add features

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA, BB, and CC shown in the image.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

*Note: the changes in equation for variable Y

A=148mm

B=64mm

C=176mm

D=26mm

E=Hole wizard standard: ISO

Type: Hex socket CTSK Head ISO 10642

Size: M8

Fit: Normal, through all

Y=1.5*B+20mm

Z=2*D

-Measure the mass of the part.

What is the mass of the part (grams)?

☐ 1491.30

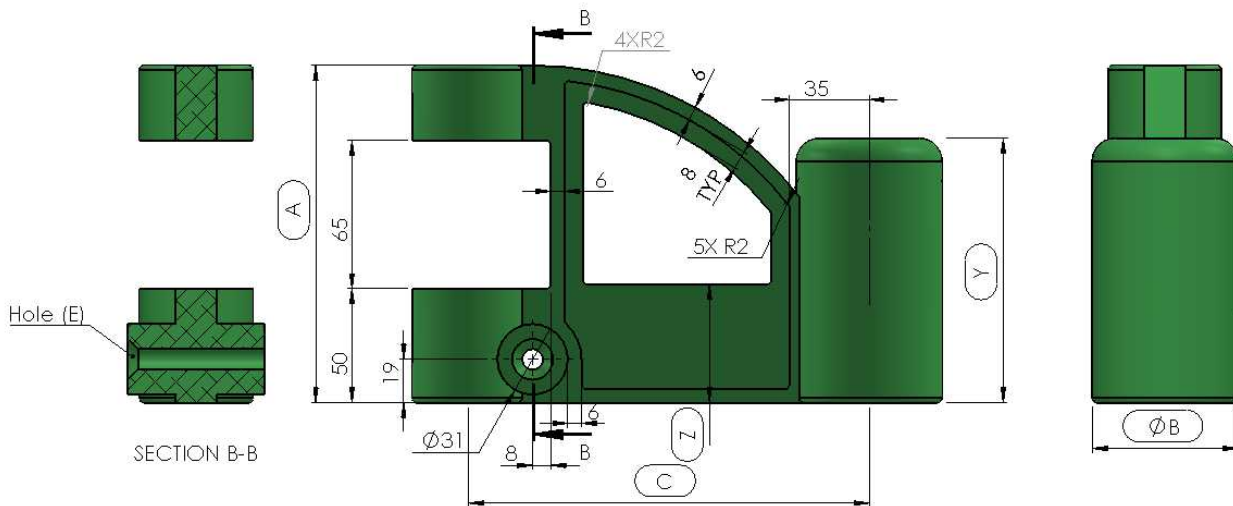
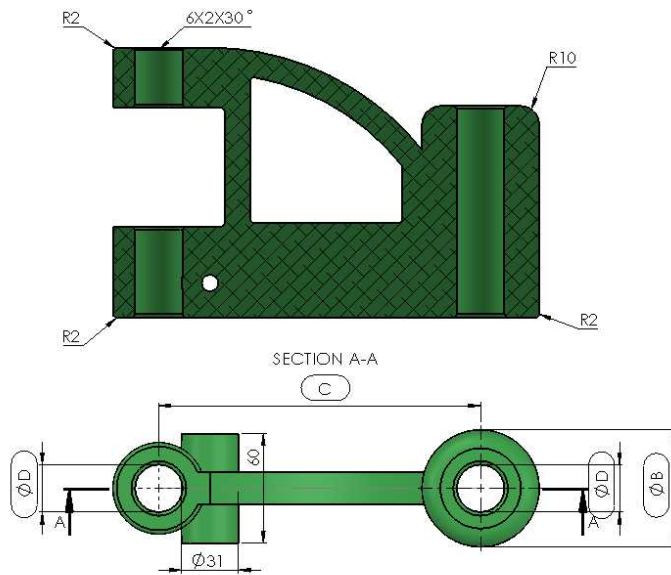
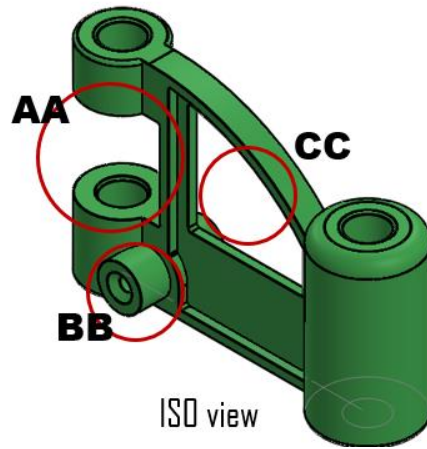
☐ 1455.25

☐ 1488.24

☐ 1470.87

[Next Question >](#)

Reference Image for Q4 of Exam Set 2 >>



Question 5 of 6

EXAM SET 2

For 25 points

Modify and add features

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA and BB shown in the image.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

*Note: the changes in equation for variable Y

A=140mm

B=55mm

C=178mm

D=29mm

Y=1.5*B+20mm

Z=2*D

Measure the mass of the part.

What the mass of the part?

☐ 998.10

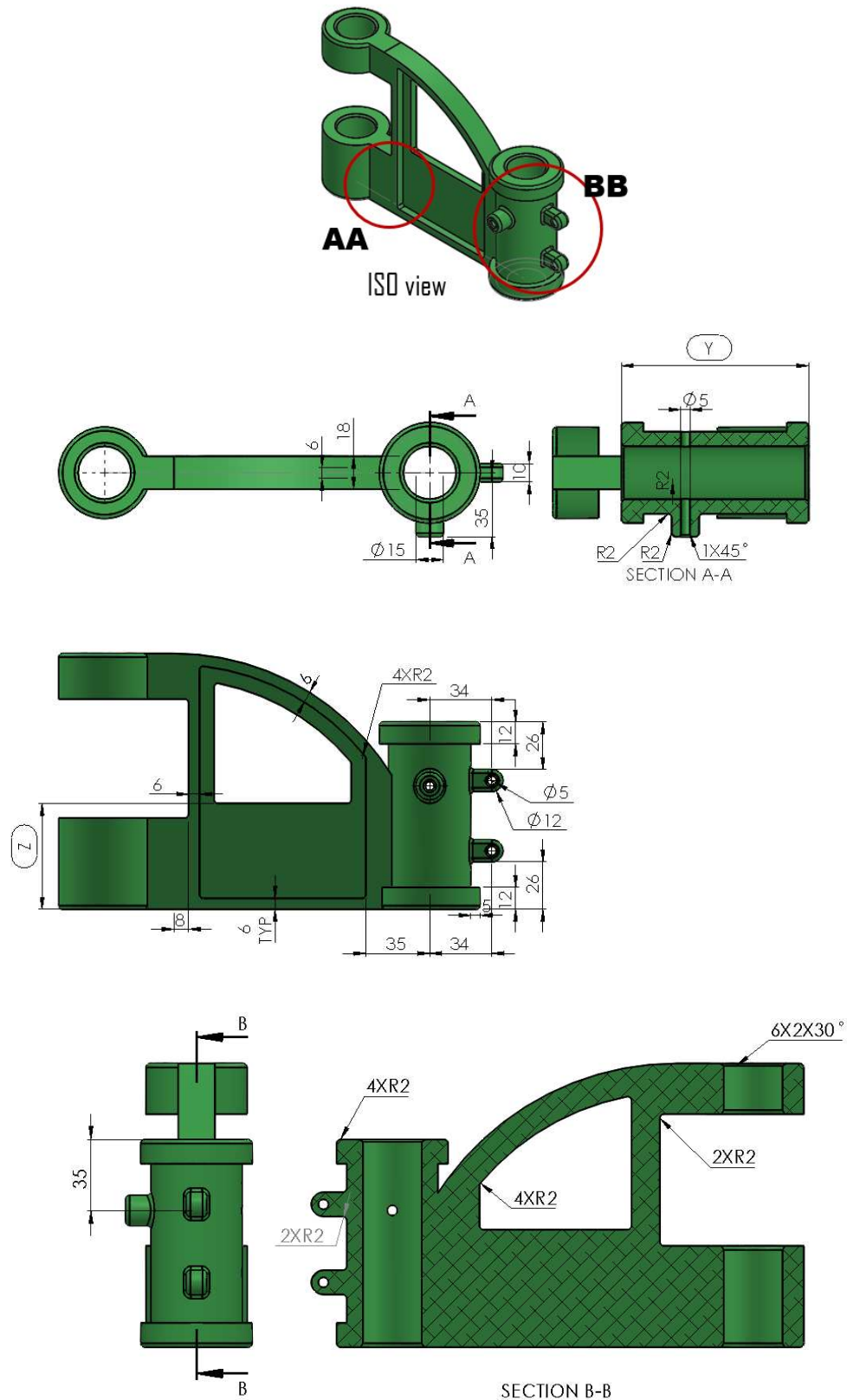
☐ 908.35

☐ 899.08

☐ 911.86

[Next Question >](#)

Reference Image for Q5 of Exam Set 2 >>



Question 6 of 6

EXAM SET 2

For 20 points

Update the parameters

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Cast Alloy Steel

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA and BB shown in the image.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

*Note: the changes in equation for variable Y

A=142mm

B=52mm

C=178mm

D=27mm

Y=1.5*B+15mm

Z=2*D

Measure the mass of the part.

What is the mass of the part (grams)?

Enter Value: []

(Use . as decimal point, 2 decimal places)

End examination

Answer Sheet

EXAM SET 1

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Initial part creation	25	☐ 1415.89
3	Update parameters	20	1488.42
4	Modify and add features	25	☐ 1491.30
5	Modify and add features	25	☐ 911.86
6	Update parameters	20	2386.78
	Total	115	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here
While **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

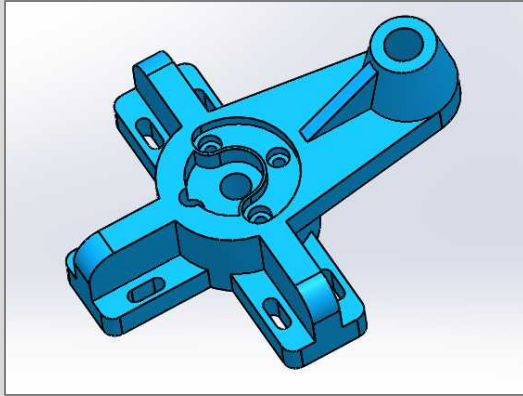
- What's your score?
- Do you finish segment 1 test within 90 minutes? ☐ Yes ☐ No
- Do you pass segment 1 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Understanding drawings
 - ☐ Create initial sketches
 - ☐ Using equations and linked values
 - ☐ Updating features
 - ☐ Modifying parameters
 - ☐ Time management

E N D o f E X A M S E T N o . 2

2.5 Practice Exam Set 3

Exam Set 3 [Segment 1]

Certified SolidWorks Professional CSWP Segment 1 Test



- Segment 1 Parts
 - Create sketches
 - Use linked values and equations
 - Create solid model
 - Measure the mass of the part
 - Modify the features
- Test duration: 90 min
- Total points: 155 points
- Total Questions: 6
- Pass score: 85

[Start Examination>](#)

Question 1 of 6

EXAM SET 3

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 6 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 90 minutes to complete this examination
- Minimum passing score is 85 out of 115

Press **Start** Examination button to continue.

Start**Question 1.**

This text describes the problem that must be solved in this problem set
You will be creating a part using the drawings and parameters specified in the following questions. Later you will modify your part using design changes given to you.
You will be asked to do the followings.

- Create initial sketches and parameters
- Create and use linked dimensional values and equations
- Create your solid model using various features
- Measure the mass of your finished part
- Modify existing parameters
- Modify the geometry of the base part to create a more advanced part

HINT #1

The dimensions that are to be linked or updated and are variable will be labelled with letters. Any dimensions that are simple value changes from one stage to another will be circled in the images.

HINT #2

To save the most time, make use of linked dimensional values and equations

Please select continue to the next question.

Continue

Question 2 of 6

EXAM SET 3

For 25 points

Initial part creation

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-Use the following parameters and equations which correspond to the dimensions labelled in the images.

*Note that hole wizard used custom sizing option to define the dimensions of the hole.

A=245mm**B**=63mm**C**=110mm**D**=42mm**X**=D/2 +3**Y**=C/2 +5**F**=Hole wizard standard : ANSI Metric

Type: Hex Cap Screw-ANSI B18.2.3.1M

Size: M12

Fit: Normal, Through all

Through hole dia.= 8mm, Counterbore dia.=15mm

Counterbore depth=7mm

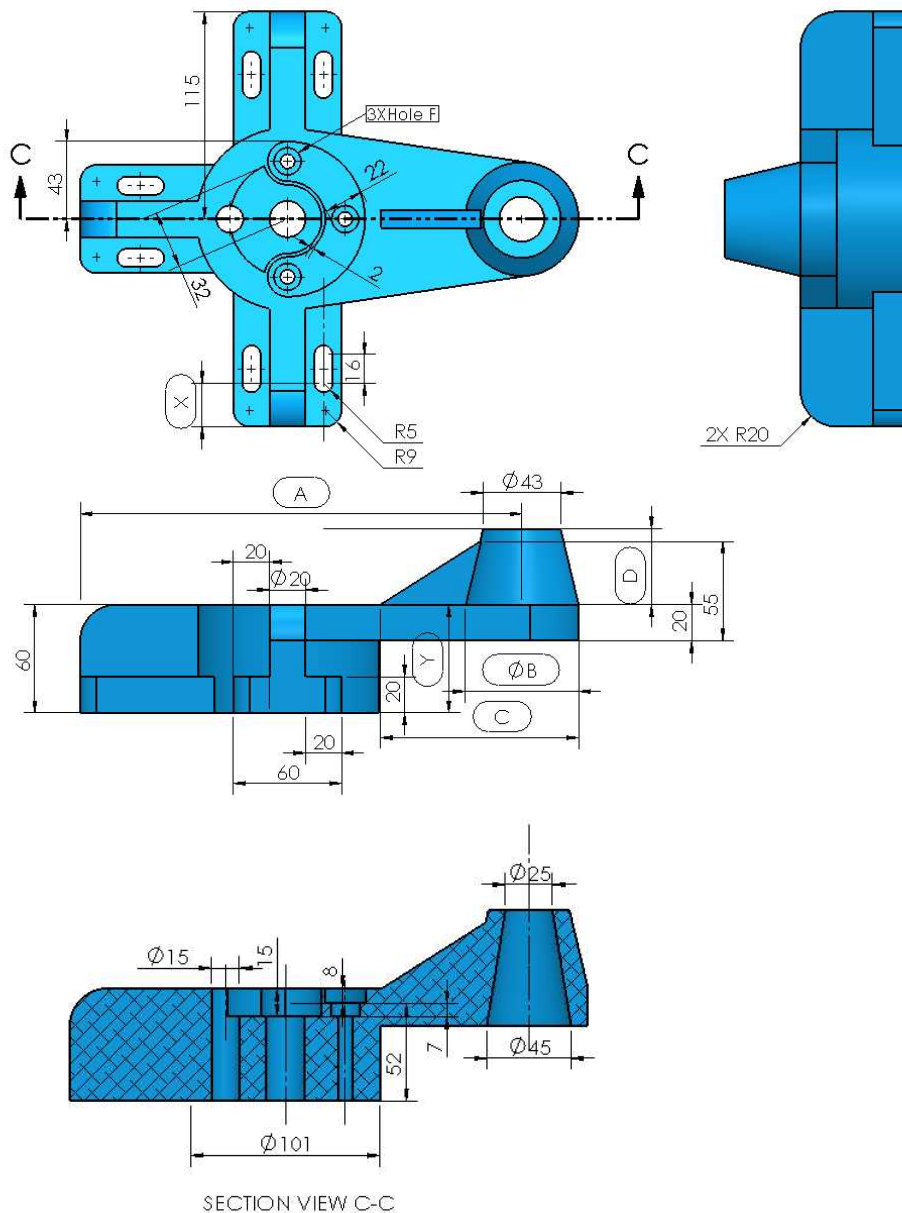
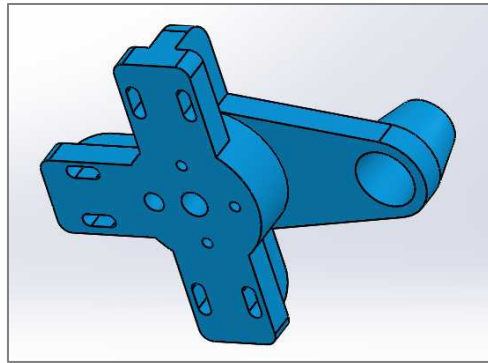
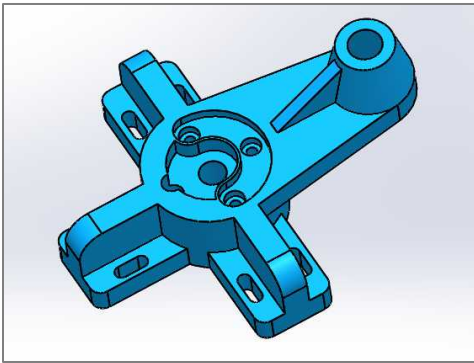
-Measure the mass of the part.

What the mass of the part?

☐ 2468.25☐ 2568.56☐ 2613.25☐ 2599.77

Next Question >

Reference Image for Q2 of Exam Set 3 >>



Question 3 of 6

EXAM SET 3

For 20 points

Update parameters of the initial part

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-Use the following parameters and equations which correspond to the dimensions labelled in the images.

*Note that the changes in equation for variable X

A=255mm

B=82mm

C=110mm

D=52mm

X=D/2 +15

Y=C/2 +5

F=Identical Configuration with Problem 2

-Measure the mass of the part.

What is the mass of the resultant part (grams)?

Enter Value: []

(Use . as decimal point, decimal places 2)

[Next Question >](#)

Question 4 of 6

EXAM SET 3

For 25 points

Modify and add features

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA, and BB shown in the image.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

*Note that the changes in equation for variable X

A=245mm

B=63mm

C=110mm

D=52mm

X=D/2

Y=C/2 +5

F=Identical Configuration with Problem 2

-Measure the mass of the part.

What is the mass of the part (grams)?

☐ 2488.55

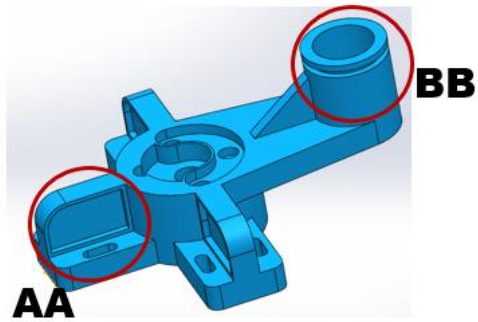
☐ 2628.56

☐ 2614.25

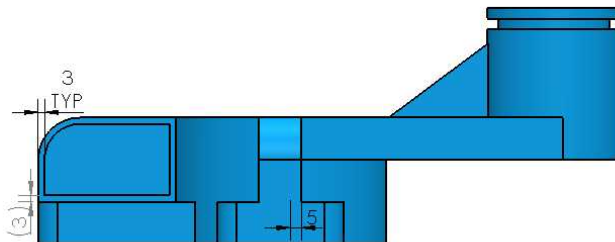
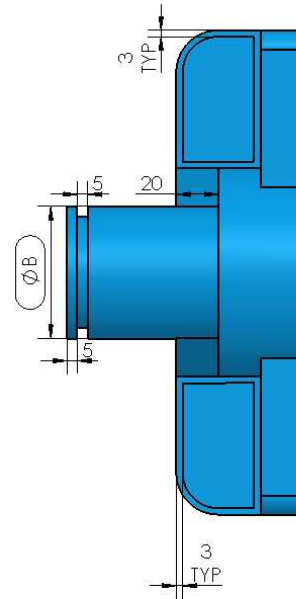
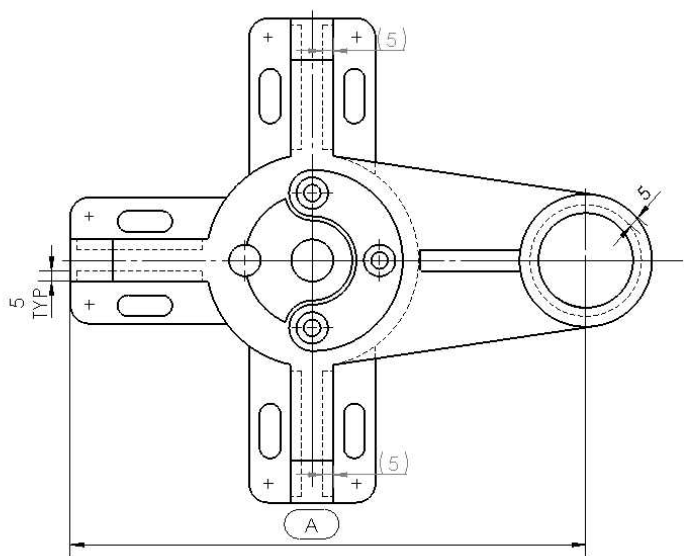
☐ 2729.77

[Next Question >](#)

Reference Image for Q4 of Exam Set 3 >>



ISO view



Question 5 of 6

EXAM SET 3

For 25 points

Modify and add features

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA, and BB shown in the image.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

*Note that the changes in equation for variable X and new equation 'Z'

A=255mm

B=70mm

C=110mm

D=62mm

X=D/2-10

Y=C/2 +5

Z=Y/2

F=Identical Configuration with Problem 2 (Two holes)

-Measure the mass of the part.

What the mass of the part?

☐ 2483.55

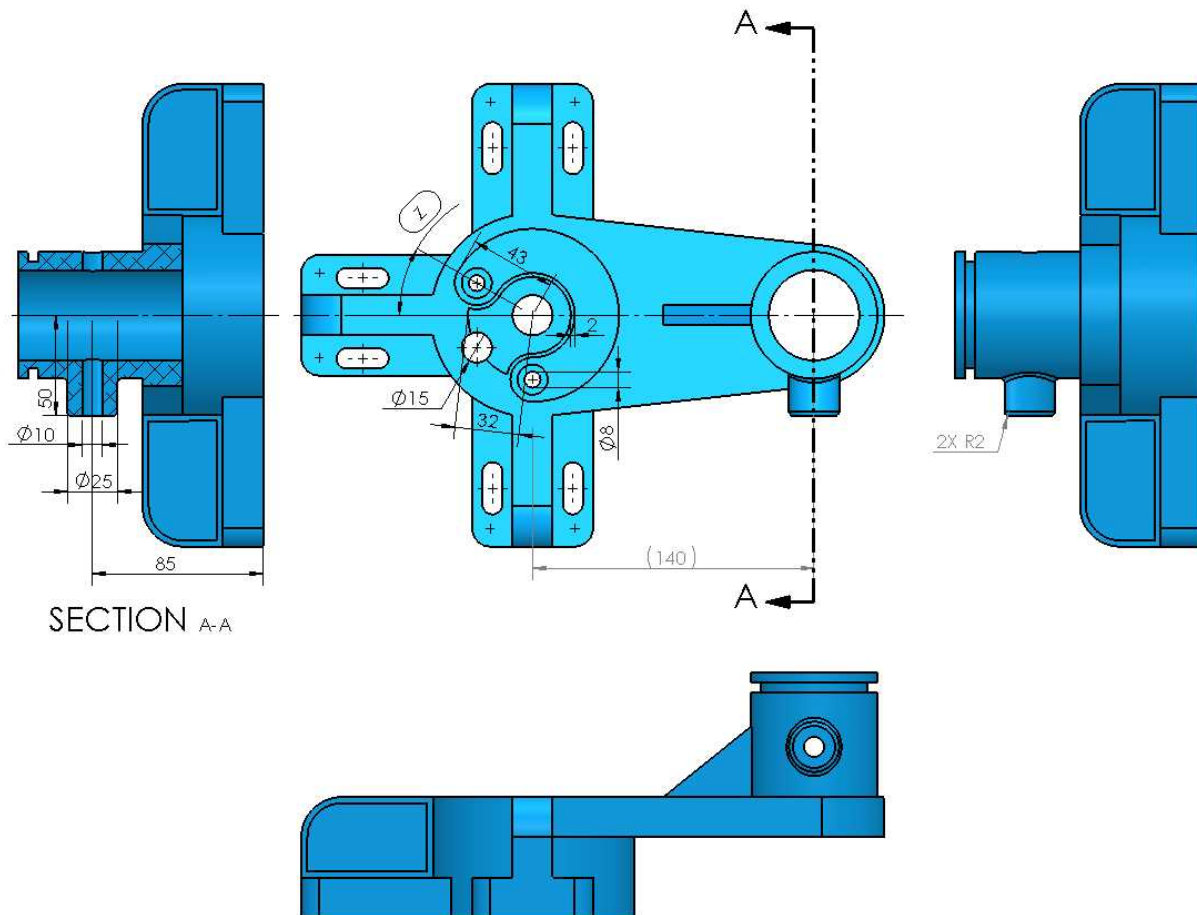
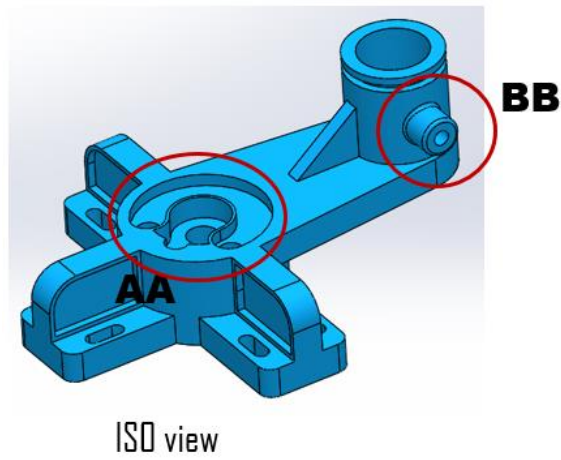
☐ 2628.56

☐ 2635.23

☐ 2729.77

[Next Question >](#)

Reference Image for Q5 of Exam Set 3 >>



Question 6 of 6

EXAM SET 3

For 20 points

Update the parameters

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-All holes through all unless shown otherwise.

-Use the following parameters and equations which correspond to the dimensions labelled in the images.

A=255mm

B=80mm

C=110mm

D=70mm

X=D/2-10

Y=C/2 +5

Z=Y/2 +15

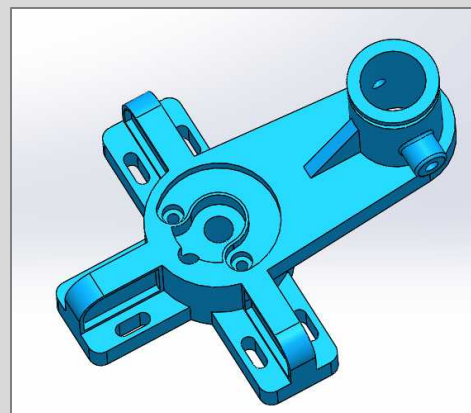
F=Identical Configuration with Problem 2 (Two holes)

-Measure the mass of the part.

What is the mass of the part (grams)?

Enter Value:

(Use . as decimal point, decimal places 2)

[End examination](#)

Answer Sheet

EXAM SET 3

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Initial part creation	25	☐ 2613.25
3	Update parameters	20	2812.33
4	Modify and add features	25	☐ 2483.79
5	Modify and add features	25	☐ 2635.23
6	Update parameters	20	2734.03
	Total	115	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here
While **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

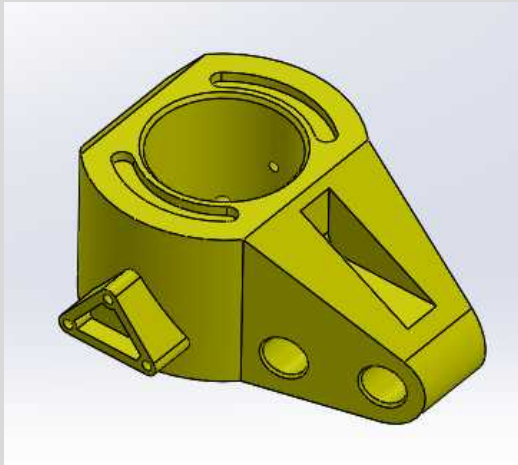
- What's your score?
- Do you finish segment 1 test within 90 minutes? ☐ Yes ☐ No
- Do you pass segment 1 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Understanding drawings
 - ☐ Create initial sketches
 - ☐ Using equations and linked values
 - ☐ Updating features
 - ☐ Modifying parameters
 - ☐ Time management

E N D o f E X A M S E T N o . 3

2.6 Practice Exam Set 4

Exam Set 4 [Segment 1]

Certified SolidWorks Professional CSWP Segment 1 Test



- Segment 1 Parts
 - Create sketches
 - Use linked values and equations
 - Create solid model
 - Measure the mass of the part
 - Modify the features
- Test duration: 90 min
- Total points: 155 points
- Total Questions: 6
- Pass score: 85

[Start Examination>](#)

Question 1 of 6

EXAM SET 4

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 6 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 90 minutes to complete this examination
- Minimum passing score is 85 out of 115

Press **Start** Examination button to continue.

Start**Question 1.**

This text describes the problem that must be solved in this problem set
You will be creating a part using the drawings and parameters specified in the following questions. Later you will modify your part using design changes given to you.
You will be asked to do the followings.

- Create initial sketches and parameters
- Create and use linked dimensional values and equations
- Create your solid model using various features
- Measure the mass of your finished part
- Modify existing parameters
- Modify the geometry of the base part to create a more advanced part

HINT #1

The dimensions that are to be linked or updated and are variable will be labelled with letters.
Any dimensions that are simple value changes from one stage to another will be circled in the images.

HINT #2

To save the most time, make use of linked dimensional values and equations

Please select continue to the next question.

Continue

Question 2 of 6

EXAM SET 4

For 25 points

Initial part creation

Build this part in SolidWorks

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Ti-6Al-4V Solution Treated and Aged

Density: 0.0044g/mm³

-All holes through all unless shown otherwise.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

A=70mm**B**=125mm**C**=80mm**D**=20mm**X**=D/2+5mm

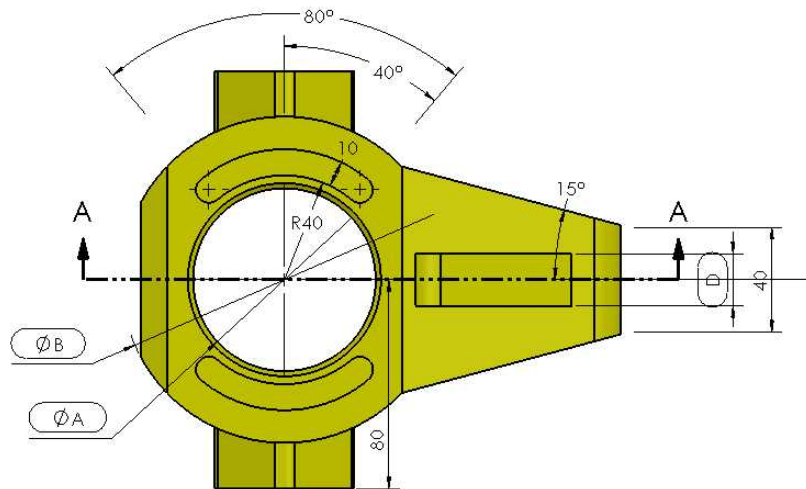
-Measure the mass of the part.

What the mass of the part?

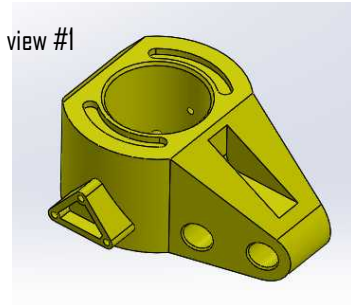
☐ 3655.36☐ 3526.77☐ 3425.32☐ 3676.03

Next Question >

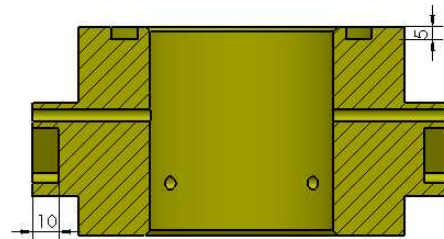
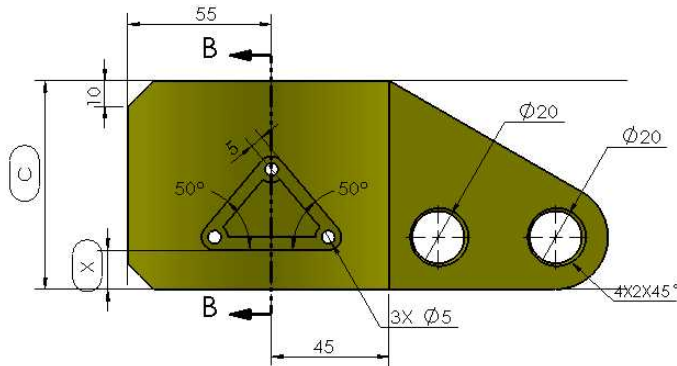
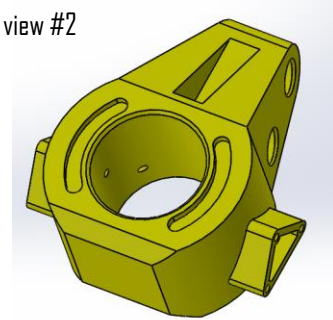
Reference Image for Q2 of Exam Set 3 >>



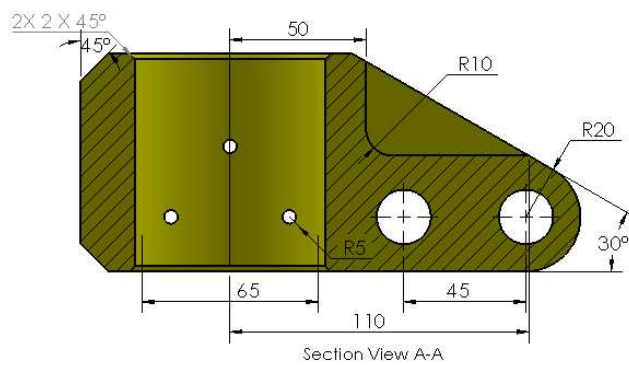
ISO view #1



ISO view #2



Section View B-B



Section View A-A

Question 3 of 6

EXAM SET 4

For 20 points

Update parameters of the initial part

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Ti-6Al-4V Solution Treated and Aged

Density: 0.0044g/mm³

-All holes through all unless shown otherwise.

-Use the following parameters and equations which correspond to the dimensions labelled in the images

A=68mm

B=125mm

C=78mm

D=35mm

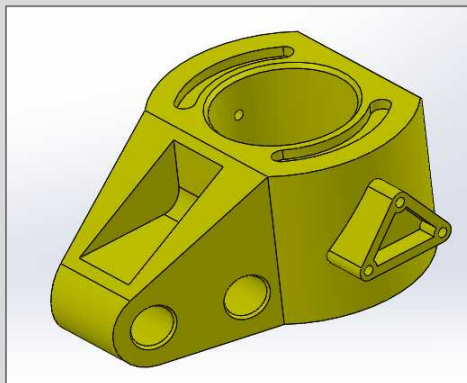
X=D/2+10mm

-Measure the mass of the part.

What is the mass of the resultant part (grams)?

Enter Value: []

(Use . as decimal point, decimal places 2)

[Next Question >](#)

Question 4 of 6

EXAM SET 4

For 25 points

Modify and add features

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Ti-6Al-4V Solution Treated and Aged

Density: 0.0044g/mm³

-All holes through all unless shown otherwise.

-This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA, BB, and CC shown in the image.

-Use the following parameters and equations which correspond to the dimensions labelled in the images.

A=70mm

B=125mm

C=80mm

D=20mm

X=D/2+5mm

E=Hole wizard standard: ANSI Metric

Type: Counterbore Hex Screw-ANSI B18.6.7M

Size: M4

Fit: Normal, Through all

-Measure the mass of the part.

What is the mass of the part (grams)?

☐ 3752.23

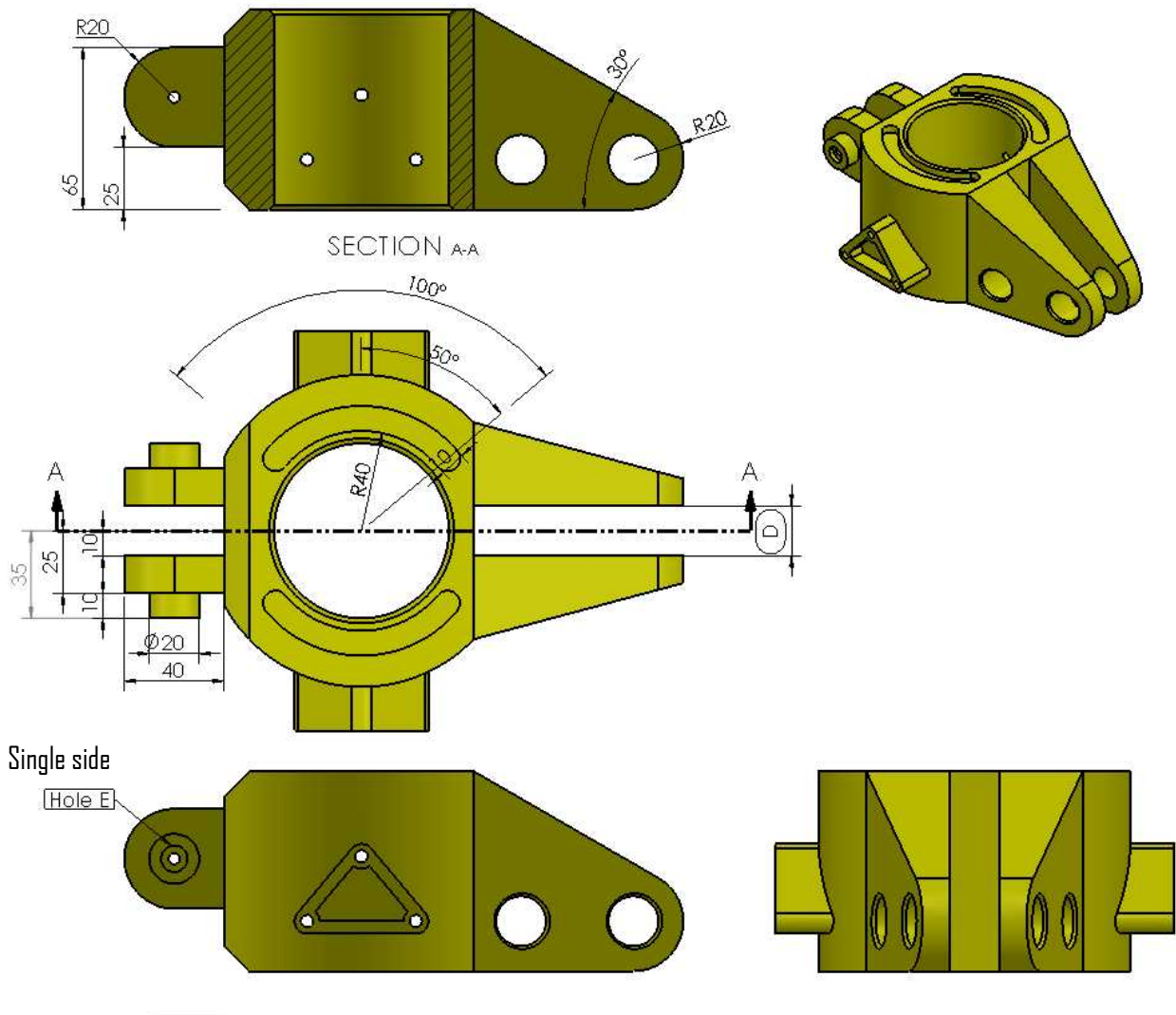
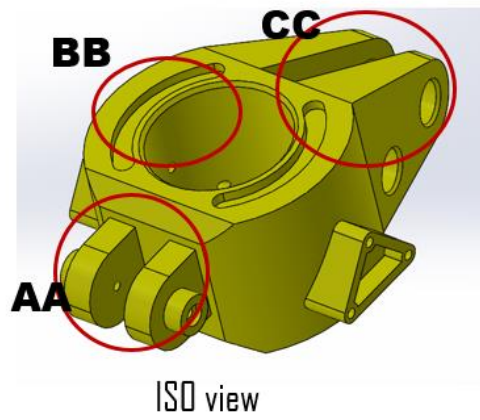
☐ 3564.24

☐ 3688.78

☐ 3622.93

[Next Question >](#)

Reference Image for Q4 of Exam Set 4 >>



Question 5 of 6

EXAM SET 4

For 25 points

Modify and add features

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Ti-6Al-4V Solution Treated and Aged

Density: 0.0044g/mm³

-All holes through all unless shown otherwise.

-This part is to be modified using the following instructions and parameters. The changes are concentrated in area AA and BB shown in the image.

-Use the following parameters and equations which correspond to the dimensions labelled in the images.

*Note that new linked value 'Y' was created.

A=65mm

B=128mm

C=80mm

D=26mm

$X = D/2 + 5\text{mm}$

$Y = C/2$

E=Hole wizard standard: ANSI Metric

Type: Counterbore Hex Screw-ANSI B18.6.7M

Size: M4

Fit: Normal, Through all

-Measure the mass of the part.

What the mass of the part?

☐ 4253.69

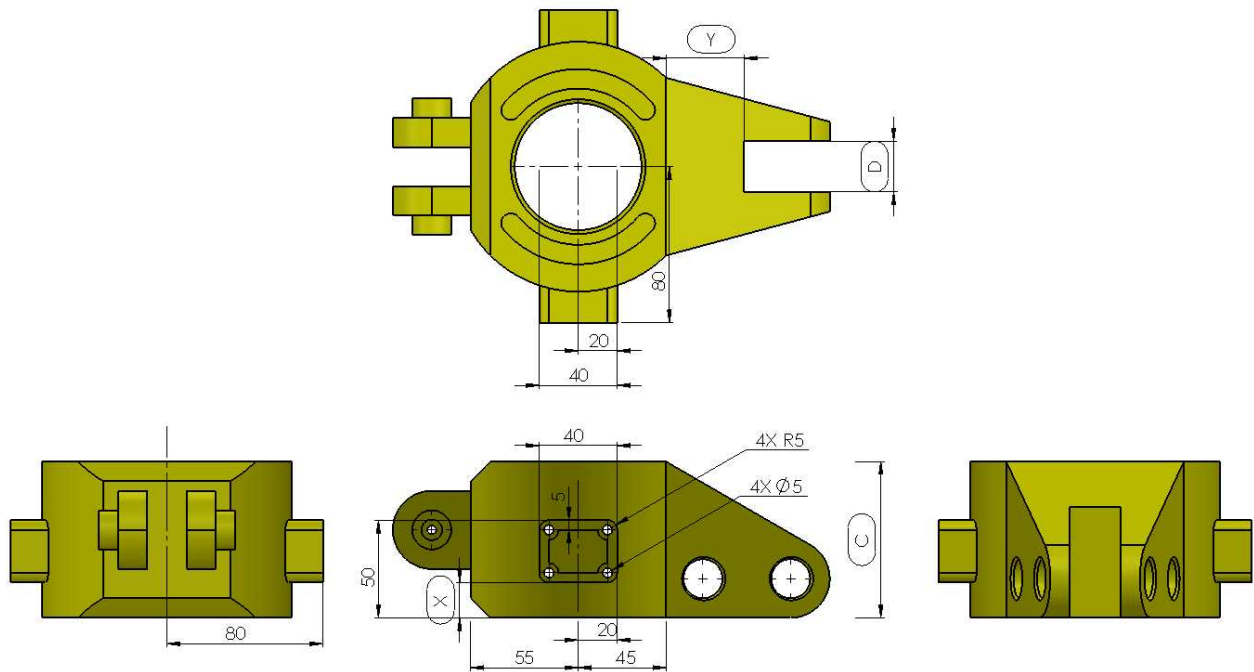
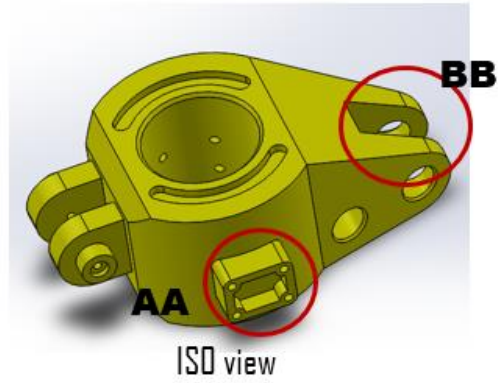
☐ 4158.23

☐ 4288.33

☐ 4157.87

[Next Question >](#)

Reference Image for Q5 of Exam Set 4 >>



Question 6 of 6

EXAM SET 4

For 20 points

Update the parameters

Build this part in SolidWorks (Same part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Brass

Density: 0.0085g/mm³

-All holes through all unless shown otherwise.

-Use the following parameters and equations which correspond to the dimensions labelled in the images.

*Note that material has been changed.

A=68mm

B=130mm

C=82mm

D=28mm

X=D/2+5mm

Y=C/2-5

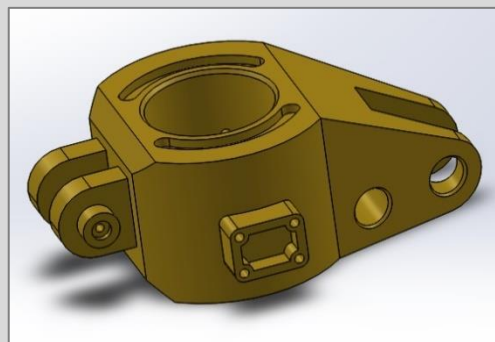
E=Identical Configuration with Problem 2

-Measure the mass of the part.

What is the mass of the part (grams)?

Enter Value:

(Use . as decimal point, decimal places 2)



End examination

Answer Sheet

EXAM SET 4

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Initial part creation	25	☐ 3676.03
3	Update parameters	20	3546.26
4	Modify and add features	25	☐ 3622.93
5	Modify and add features	25	☐ 4157.87
6	Update parameters	20	8151.80
	Total	115	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here,
While **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

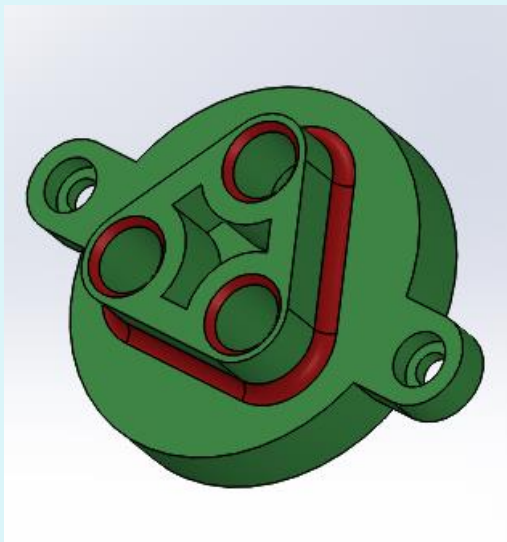
- What's your score?
- Do you finish segment 1 test within 90 minutes? ☐ Yes ☐ No
- Do you pass segment 1 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Understanding drawings
 - ☐ Create initial sketches
 - ☐ Using equations and linked values
 - ☐ Updating features
 - ☐ Modifying parameters
 - ☐ Time management

E N D o f E X A M S E T N o . 4

2.7 Practice Exam Set 5 (Revised form)

Exam Set 5 [Segment 1]

Certified SolidWorks Professional CSWP Segment 1 Test



- Segment 1 Parts
 - Create sketches
 - Use linked values and equations
 - Create solid model
 - Measure the mass of the part
 - Modify the features
- Test duration: 70 min
- Total points: 105 points
- Total Questions: 12
- Pass score: 75 points

[Start Examination>](#)

Examination Information

Welcome to the CSWP Segment 1 Core Exam (CSWPCORE)

As per the Candidate Conduct Policy you have agreed to, all models you submit in response to the questions in this SOLIDWORKS Certification exam will be your original work, and you did not reuse any models from a social website or other website. Also, all answers you submit in the SOLIDWORKS Certification exam are your own and you will not obtain any answer from a third party source.

- You exam is: **11 questions**.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have **70 minutes** to complete this examination.
- Minimum passing score is: **75 points**.
- Your proctor is: Virtual Tester Online

Press the Start Examination button to continue

Start Examination >>

Question 1 of 11

For 5 points

Part creation and modification problem set :

This test describes the problem set that must be solved in this problem set. Please read this in its entirety before proceeding and click Yes for 5 points.

Please note that the use of other test taker's completed models and assemblies can lead to the annulment of your results per the Candidate Conduct Policy you agreed to.

You will create a part using the drawings and parameters specified in the following questions.

Note: The images shown may not be to proportion depending on the parameters you are given. They are meant as a reference only for the dimensions and parameters used to create the part.

Note: All dimensions needed to build the part correctly and follow the design intent are represented in the images.

Note: Your answer should be within 0.5% of the correct answer to be marked correctly. For example, if the correct answer is 500 grams, then the allowed deviation for your answer is 2.5 grams.

☒ Yes

[Next question >>](#)

Question 2 of 11

For 10 points

Initial part creation, Stage 1.

Build this part in SolidWorks

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: AISI 304

Density: 0.0080g/mm³

Note: new fillets and rounds to be created are highlighted in RED in the images for better clarity.

-There are 3 total fillets and 1 round edge.

-Use the following parameters and equations which correspond to the dimensions labeled in the images:

A = 100mm

B = 35mm

C = 125mm

D = 18mm

X = A/4

F=Hole wizard standard: ANSI Metric

Type: Counterbore Hex Screw –ANSI B18.6.7M

Size: M8

Fit: Normal, Through all

Through hole dia. = 9mm, Counterbore dia. =15mm, Counterbore depth=6mm

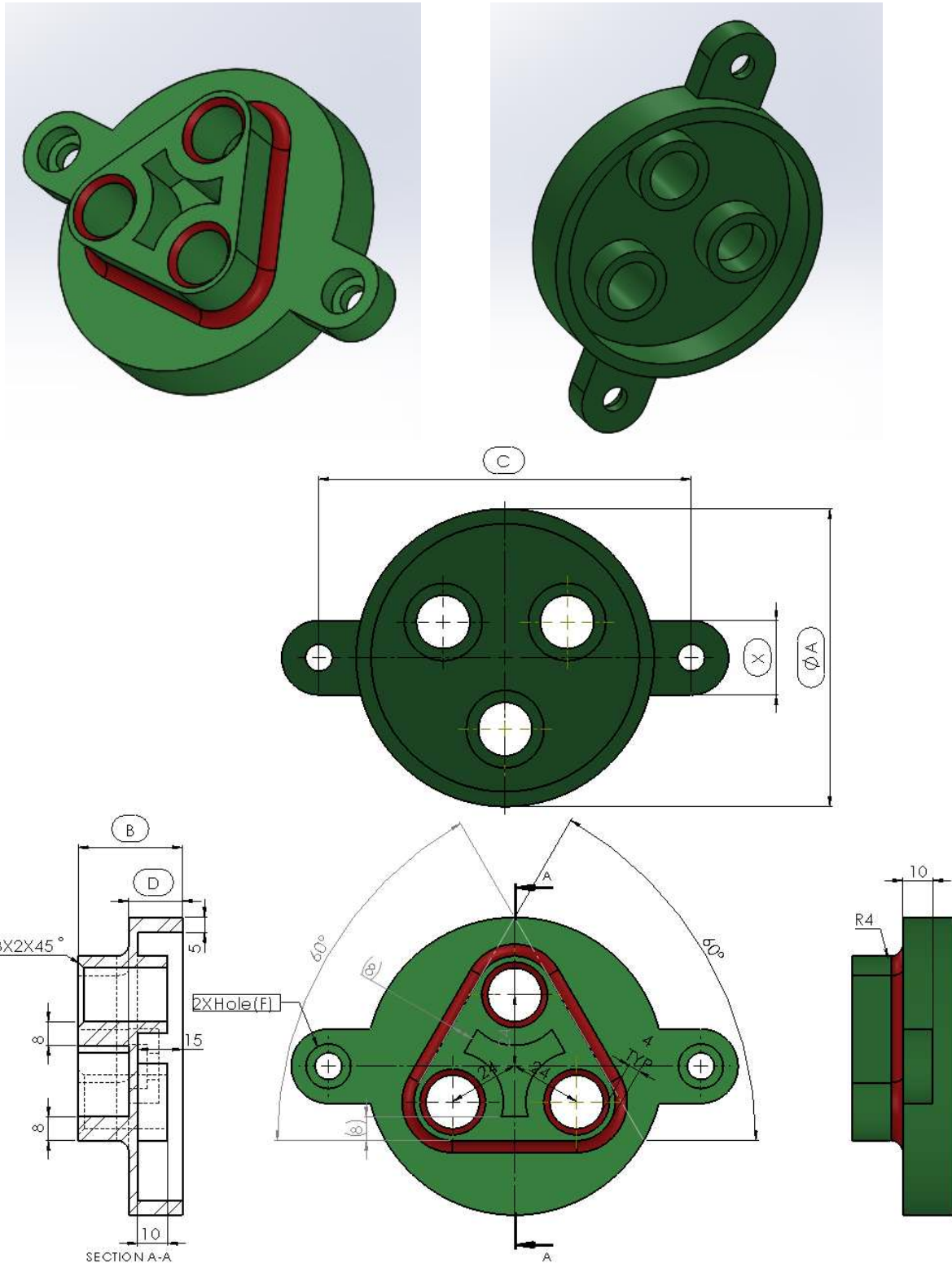
- Measure the mass of the part.

What is the mass of the part (grams)?

☐ 768.25 ☐ 723.27 ☐ 722.99 ☐ 719.77

[Next question >>](#)

Reference Image for Q2 of Exam Set 6 >>



Question 3 of 11

For 10 points

Update parameters, Stage 1.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: AISI 304

Density: 0.0080g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A=98mm

B=40mm

C=130mm

D=20mm

X=A/4+5

F= same configuration in previous question

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Question 4 of 11

For 10 points

Update parameters, Stage 1.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: AISI 304

Density: 0.0080g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A=105mm

B=38mm

C=120mm

D=20mm

X=A/4+2

F= same configuration in previous question

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Question 5 of 11

For 10 points

Modify the part, Stage 2.

Build this part in SOLIDWORKS. (Save part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

All holes through all unless shown otherwise

Radius of fillets and rounds R = 4mm unless otherwise noted

-Use the part from the previous question.

-The part is to be modelled using the following instructions and parameters. The changes are concentrated in area AA and BB indicated in the image with the drawing.

-Updates the parameters to the following values:

-Note that new parameter 'Y' was added and material was changed to 1060 Alloy.

A=105mm

B=38mm

C=120mm

D=20mm

X=A/4+2

Y=D/2

F= same configuration in previous question

☐ 315.12

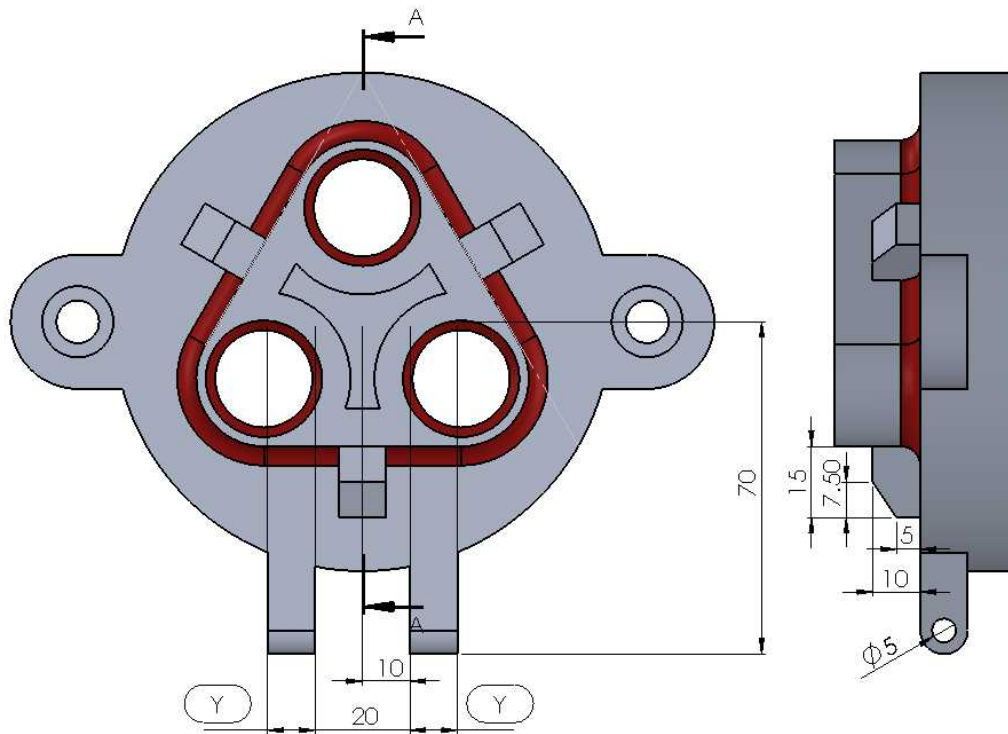
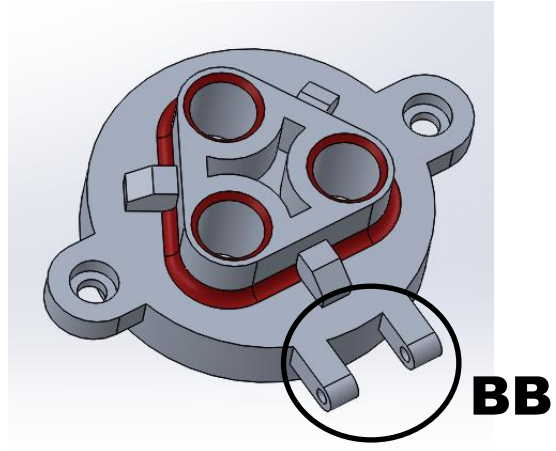
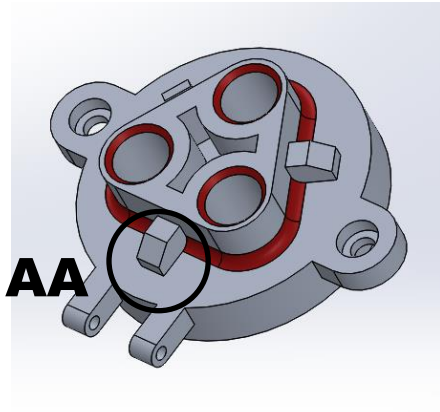
☐ 324.04

☐ 340.87

☐ 336.56

[Next question >>](#)

Reference Image for Q5 of Exam Set 8 >>



Question 6 of 11

For 10 points

Update parameters, Stage 2.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A=100mm

B=36mm

C=120mm

D=22mm

X=A/4+2

Y=D/2+2

F= same configuration in previous question

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Question 7 of 11

For 10 points

Update parameters, Stage 2.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A=100mm

B=38mm

C=110mm

D=18mm

X=A/4

Y=D/2+2

F= same configuration in previous question

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Question 8 of 11

For 10 points

Modify the part, Stage 3.

Build this part in SOLIDWORKS. (Save part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

All holes through all unless shown otherwise

Radius of fillets and rounds R = 4mm unless otherwise noted

-Use the part from the previous question.

-The part is to be modelled using the following instructions and parameters. The changes are concentrated in area CC and DD indicated in the image with the drawing.

-Updates the parameters to the following values:

A=100mm

B=38mm

C=110mm

D=18mm

X=A/4

Y=D/2+2

F= same configuration in previous question

- Measure the mass of the part.

What is the mass of the part (grams)?

☐ 295.17

☐ 299.15

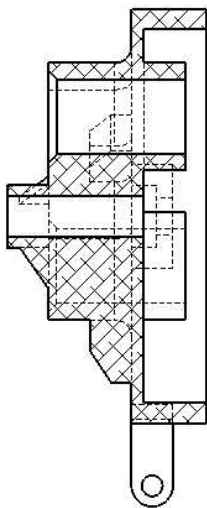
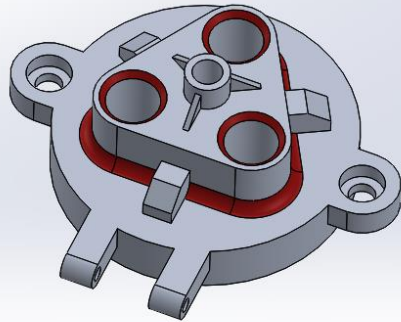
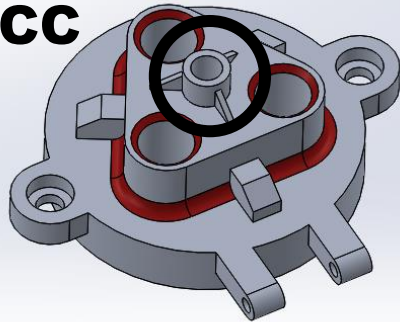
☐ 297.71

☐ 290.56

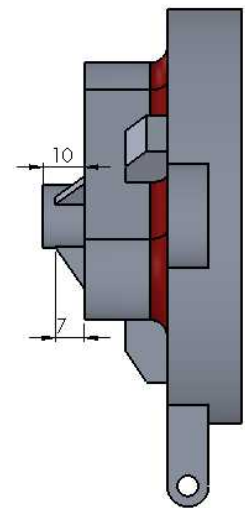
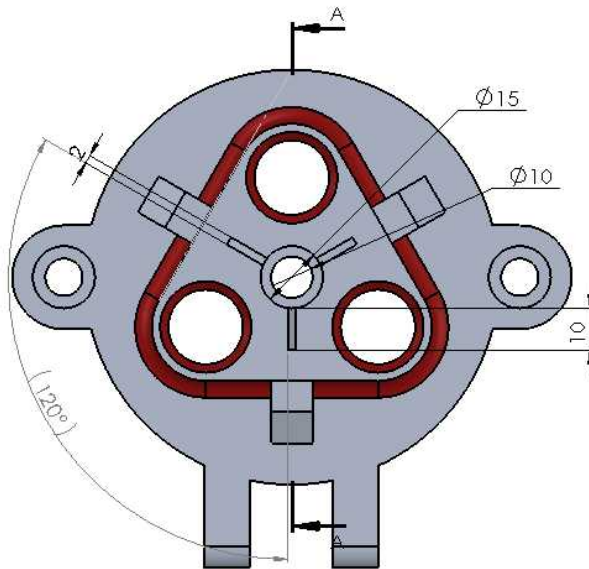
[Next question >>](#)

Reference Image for Q8 of Exam Set 5 >>

CC



SECTION A-A



Question 9 of 11

For 10 points

Update parameters, Stage 3.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A=95mm

B=34mm

C=140mm

D=20mm

X=A/5+2

Y=D/2+2

F= same configuration in previous question

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Question 10 of 11

For 10 points

Update parameters, Stage 3.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A=104mm

B=34mm

C=112mm

D=20mm

X=A/5+2

Y=D/2+2

-The model might have errors. Use the following Hole information (indicated as 'DD') to fix the errors to have correct geometry.

- Measure the mass of the part.

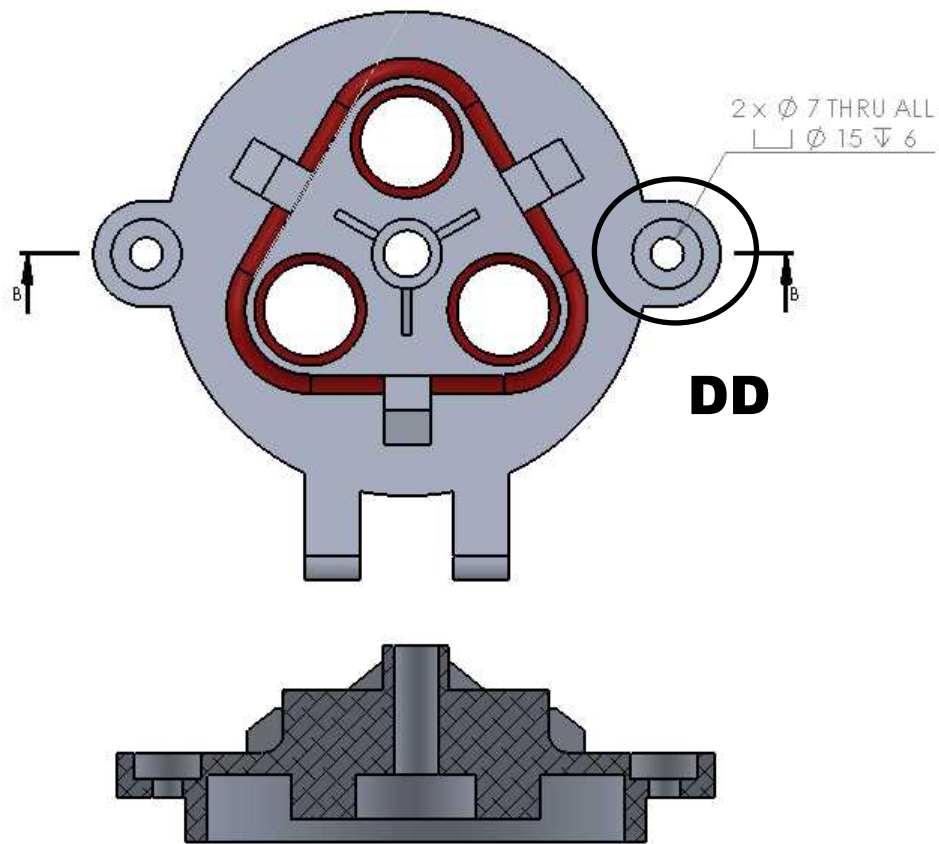
What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q10 of Exam Set 5 >>



Section view BB

Question 11 of 11

For 10 points

Update parameters, Stage 3.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A=100mm

B=40mm

C=115mm

D=20mm

X=A/5+4

Y=D/2+5

-Create external grooves as indicated in following images.

-Additional chamfers are created as shown in the following images. The highlighted area with Blue is the area where 2X45 ° Chamfer was created.

- Measure the mass of the part.

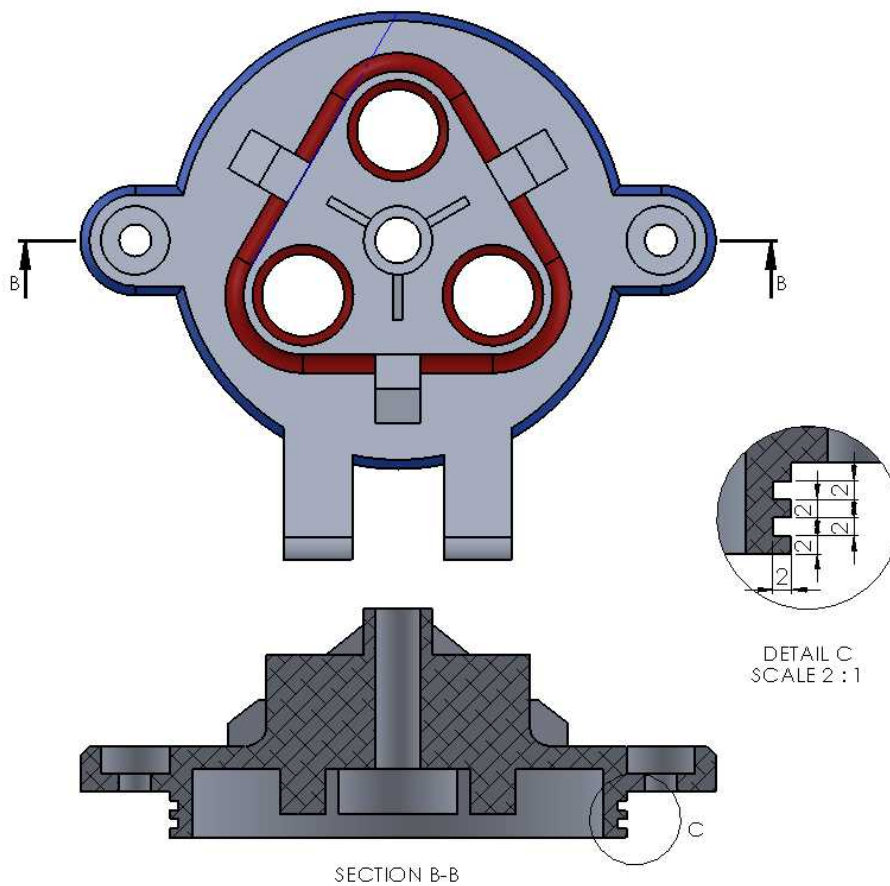
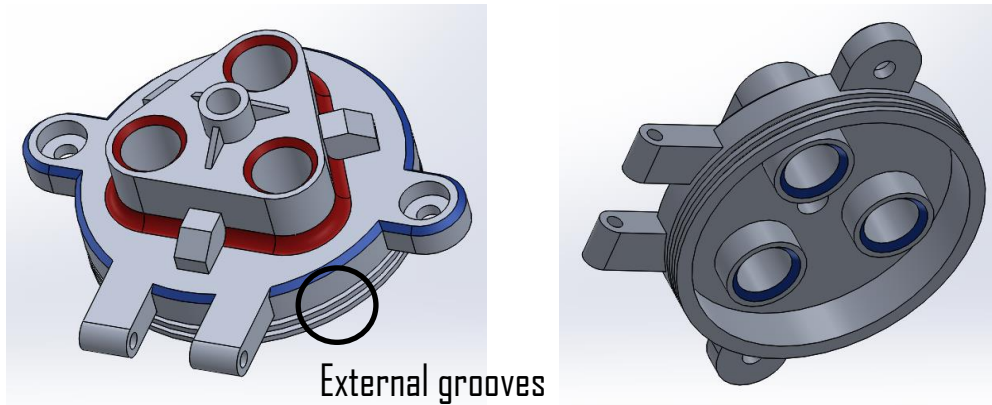
What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q11 of Exam Set 6 >>



Answer Sheet

EXAM SET 5

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	5	-
2	Stage1, Initial part creation	10	☐ 722.99
3	Stage1, Update parameters	10	896.82
4	Stage1, Update parameters	10	902.65
5	Stage2, Part modification	10	☐ 324.04
6	Stage2, Update parameters	10	331.08
7	Stage2, Update parameters	10	269.79
8	Stage3, Part modification	10	290.56
9	Stage3, Update parameters	10	280.11
10	Stage3, Recovery errors	10	303.10
11	Stage3, Add features	10	326.22
	Total	105	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here
While **Fill-in-blank** type answer should be within $\pm 0.5\%$ of provided answers.

Review

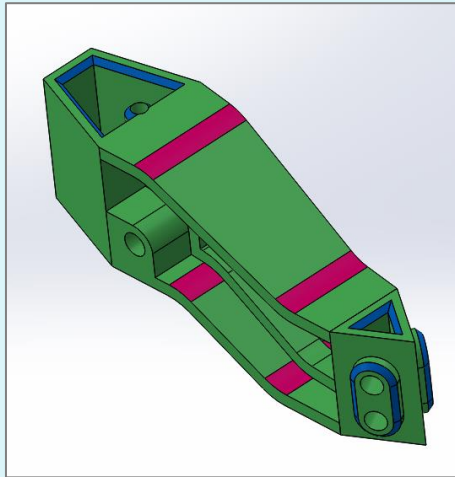
- What's your score?
- Do you finish segment 1 test within 70 minutes? ☐ Yes ☐ No
- Do you pass segment 1 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Understanding drawings
 - ☐ Create initial sketches
 - ☐ Using equations and linked values
 - ☐ Updating features
 - ☐ Modifying parameters
 - ☐ Time management

E N D o f E X A M S E T N o . 5

2.7 Practice Exam Set 6 (Revised format)

Exam Set 6 [Segment 1]

Certified SolidWorks Professional CSWP Segment 1 Test



- Segment 1 Parts
 - Create sketches
 - Use linked values and equations
 - Create solid model
 - Measure the mass of the part
 - Modify the features
- Test duration: 70 min
- Total points: 105 points
- Total Questions: 12
- Pass score: 75 points

[Start Examination>](#)

Examination Information

Welcome to the CSWP Segment 1 Core Exam (CSWPCORE)

As per the Candidate Conduct Policy you have agreed to, all models you submit in response to the questions in this SOLIDWORKS Certification exam will be your original work, and you did not reuse any models from a social website or other website. Also, all answers you submit in the SOLIDWORKS Certification exam are your own and you will not obtain any answer from a third party source.

- Your exam is: **11 questions**.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have **70 minutes** to complete this examination.
- Minimum passing score is: **75 points**.
- Your proctor is: Virtual Tester Online

Press the Start Examination button to continue

Start Examination >>

Question 1 of 11

For 5 points

Part creation and modification problem set

This test describes the problem set that must be solved in this problem set. Please read this in its entirety before proceeding and click Yes for 5 points.

Please note that the use of other test taker's completed models and assemblies can lead to the annulment of your results per the Candidate Conduct Policy you agreed to.

You will create a part using the drawings and parameters specified in the following questions.

Note: The images shown may not be to proportion depending on the parameters you are given. They are meant as a reference only for the dimensions and parameters used to create the part.

Note: All dimensions needed to build the part correctly and follow the design intent are represented in the images.

Note: Your answer should be within 0.5% of the correct answer to be marked correctly. For example, if the correct answer is 500 grams, then the allowed deviation for your answer is 2.5 grams.

☒ Yes

[Next question >>](#)

Question 2 of 11

For 10 points

Initial part creation, Stage 1.

Build this part in SolidWorks

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: AISI 304

Density: 0.0080g/mm³

Note: new fillets and rounds to be created are highlighted in RED in the images for better clarity.

-There are 12 total rounded edges, R=20mm

-Use the following parameters and equations which correspond to the dimensions labeled in the images:

A = 100mm

B = 40mm

X = A/2

Y = (2*B) / 4

- Measure the mass of the part.

What is the mass of the part (grams)?

☐ 968.54

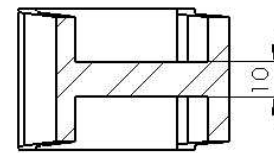
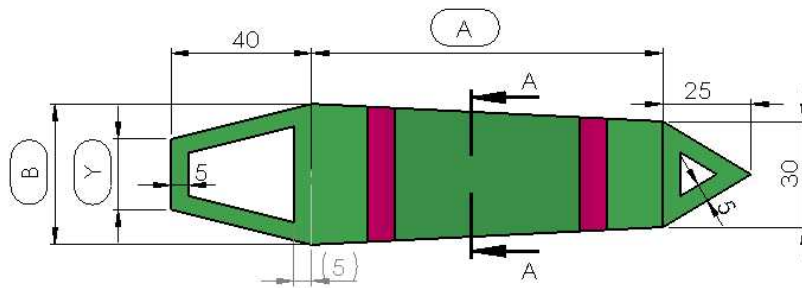
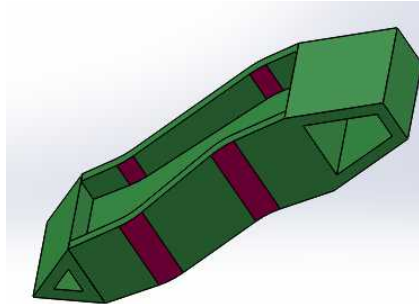
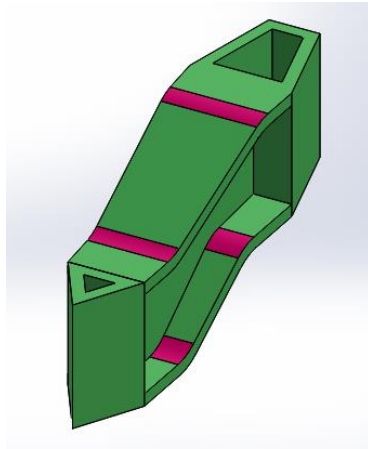
☐ 980.48

☐ 992.31

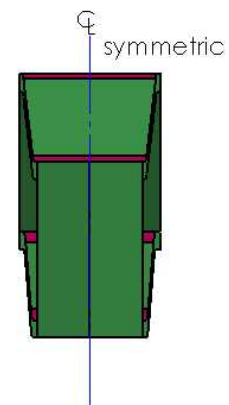
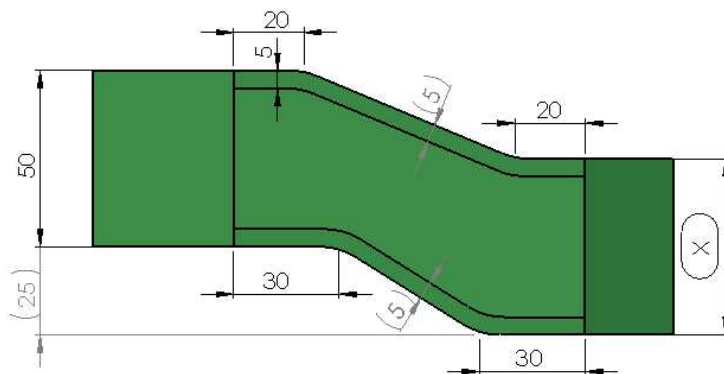
☐ 987.36

Next question >>

Reference Image for Q2 of Exam Set 6 >>



SECTION A-A



Question 3 of 11

For 10 points

Update parameters, Stage 1.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: AISI 304

Density: 0.0080g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A = 110mm

B = 45mm

X = A/2

Y = (3*B) / 4

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Question 4 of 11

For 10 points

Update parameters, Stage 1.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: AISI 304

Density: 0.0080g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A = 95mm

B = 38mm

X = A/2.5

Y = (3*B) / 4

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Question 5 of 11

For 10 points

Modify the part, Stage 2.

Build this part in SOLIDWORKS. (Save part after each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

All holes through all unless shown otherwise

Radius of fillets and rounds R = 20mm unless otherwise noted

-Use the part from the previous question.

-The part is to be modelled using the following instructions and parameters. The changes are concentrated in area AA and BB indicated in the image with the drawing.

-Updates the parameters to the following values:

-Note that new parameter 'C' was added and material was changed to 1060 Alloy.

A = 95mm

B = 38mm

C = 10mm

X = A/2.5

Y = (3*B) / 4

- Measure the mass of the part.

What is the mass of the part (grams)?

☐ 273.19

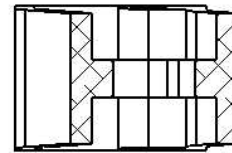
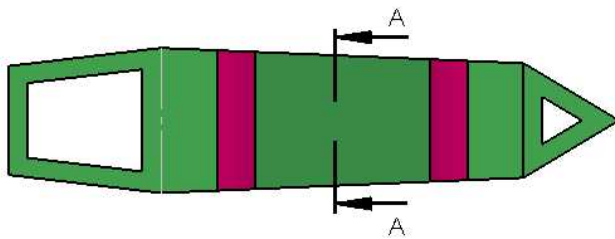
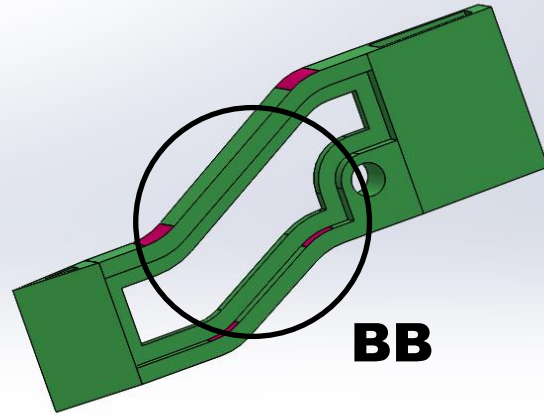
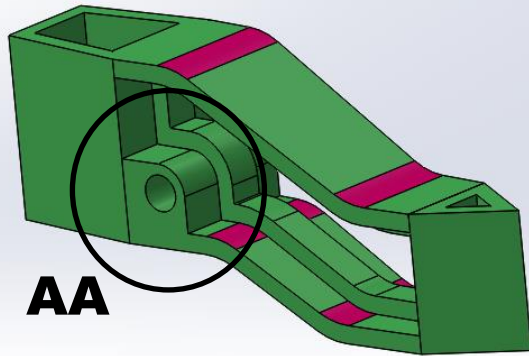
☐ 270.87

☐ 277.71

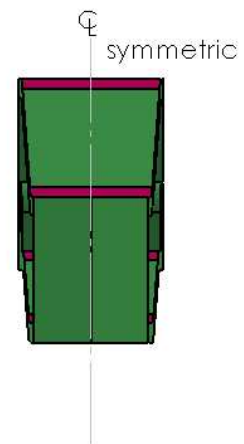
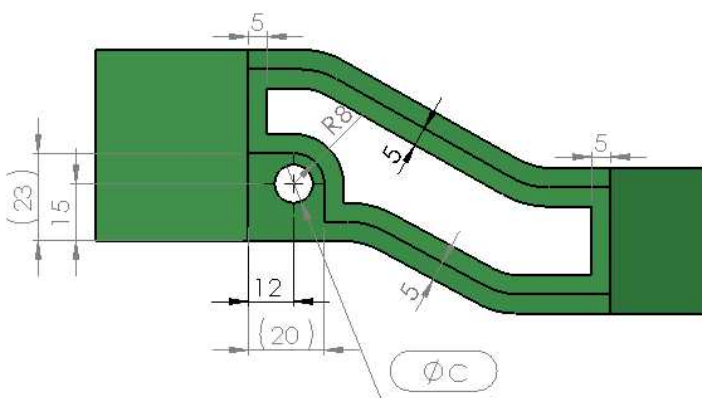
☐ 280.25

[Next question >>](#)

Reference Image for Q5 of Exam Set 8 >>



SECTION A-A



Question 6 of 11

For 10 points

Update parameters, Stage 2.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A = 100mm

B = 42mm

C = 12mm

X = A / 2

Y = B / 4

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Question 7 of 11

For 10 points

Update parameters, Stage 2.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A = 88mm

B = 35mm

C = 8mm

$X = A / 2 + 10$

$Y = B / 4 + 12$

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Question 8 of 11

For 10 points

Modify the part, Stage 3.

Build this part in SOLIDWORKS. (Save part after completing each question in a different file in case it must be reviewed)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

All holes through all unless shown otherwise

Radius of fillets and rounds R = 20mm unless otherwise noted

-Use the part from the previous question.

-The part is to be modelled using the following instructions and parameters. The changes are concentrated in area CC and DD indicated in the image with the drawing.

-Updates the parameters to the following values:

A = 88mm

B = 35mm

C = 8mm

$X = A / 2 + 10$

$Y = B / 4 + 12$

- Measure the mass of the part.

What is the mass of the part (grams)?

☐ 275.12

☐ 269.15

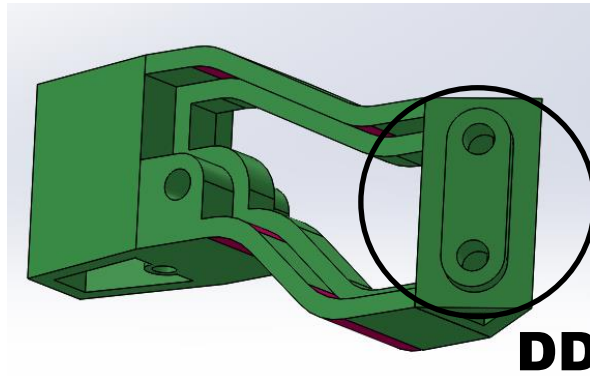
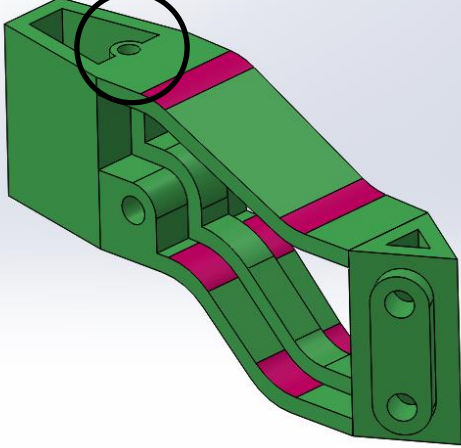
☐ 277.71

☐ 284.51

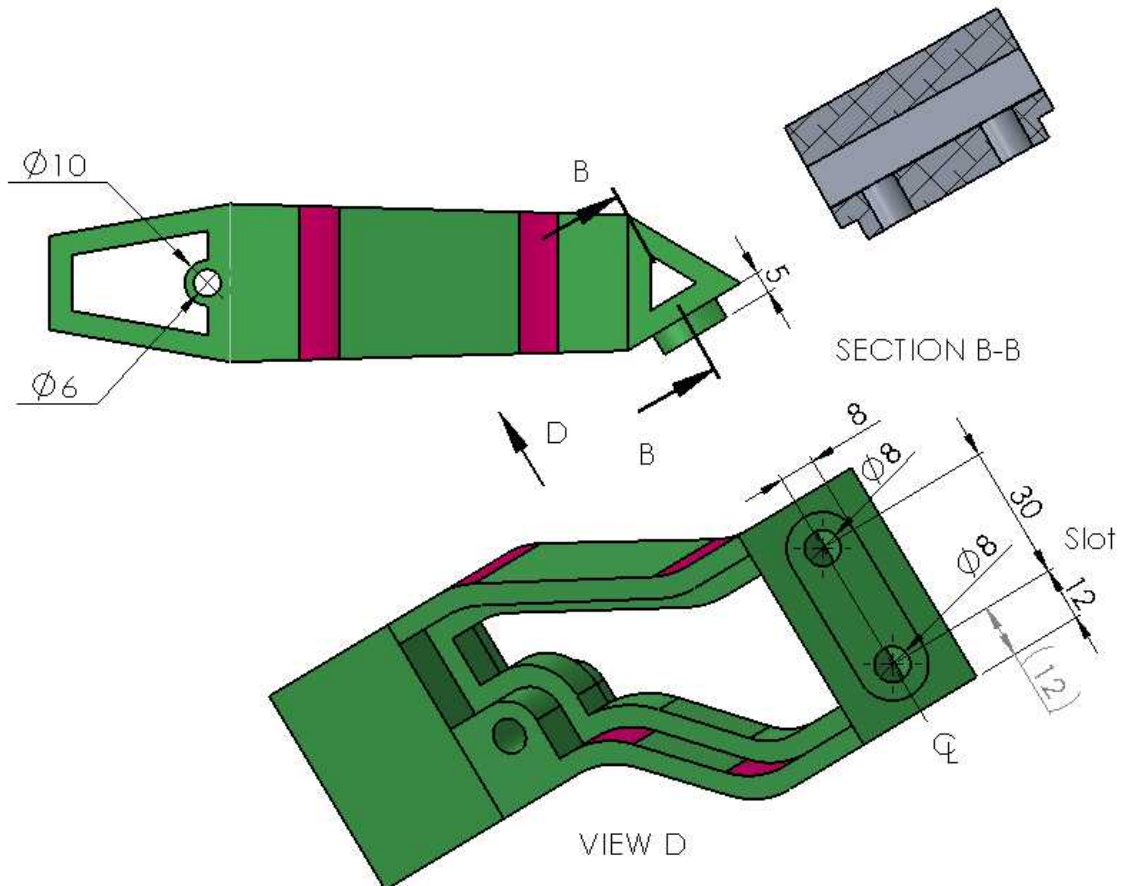
[Next question >>](#)

Reference Image for Q8 of Exam Set 6 >>

CC



DD



Question 9 of 11

For 10 points

Update parameters, Stage 3.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A = 90mm

B = 40mm

C = 12mm

$X = A / 3 + 25$

$Y = B / 4 + 8$

- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Question 10 of 11

For 10 points

Update parameters, Stage 3.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters listed below.

-Update the parameters to the following values:

A = 90mm

B = 40mm

C = 10mm

$X = A / 3 + 10$

$Y = B / 4 + 10$

-The model might have errors. Use the following information from image (indicated as 'EE') to fix the errors to have correct geometry.

- Measure the mass of the part.

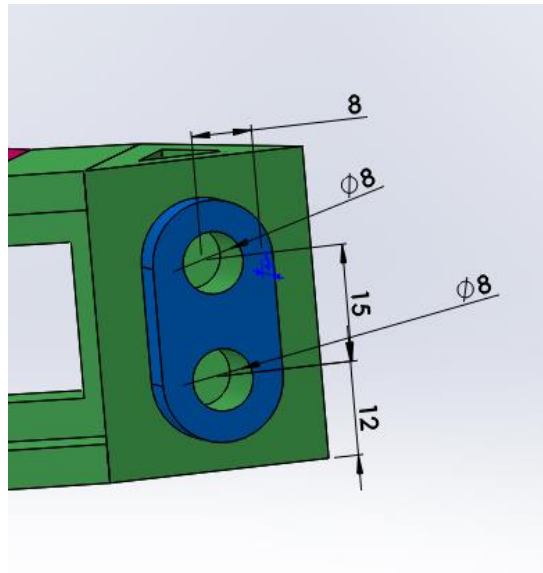
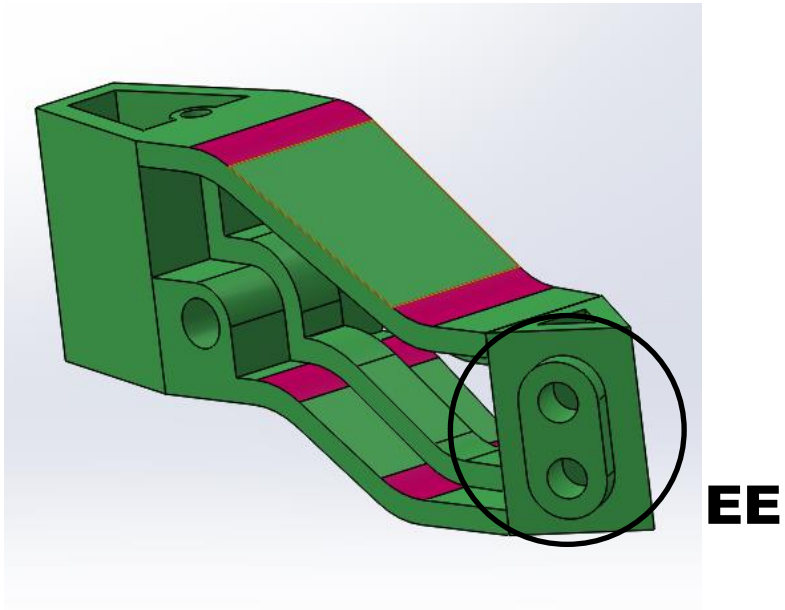
What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q10 of Exam Set 6 >>



Question 11 of 11

For 10 points

Update parameters, Stage 3.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

-Use the part from the previous question.

-The geometry of the part has remained constant from the previous question except for the values of the parameters which are listed below.

-Update the parameters to the following values:

A = 100mm

B = 45mm

C = 9mm

$X = A / 2 - 10$

$Y = B / 4 + 10$

-Mirror the Slot boss on one side and place it on both sides.

-Additional chamfers are created as shown in the following images. The highlighted area with Blue is the area where 2X45 ° Chamfer was created.

- Measure the mass of the part.

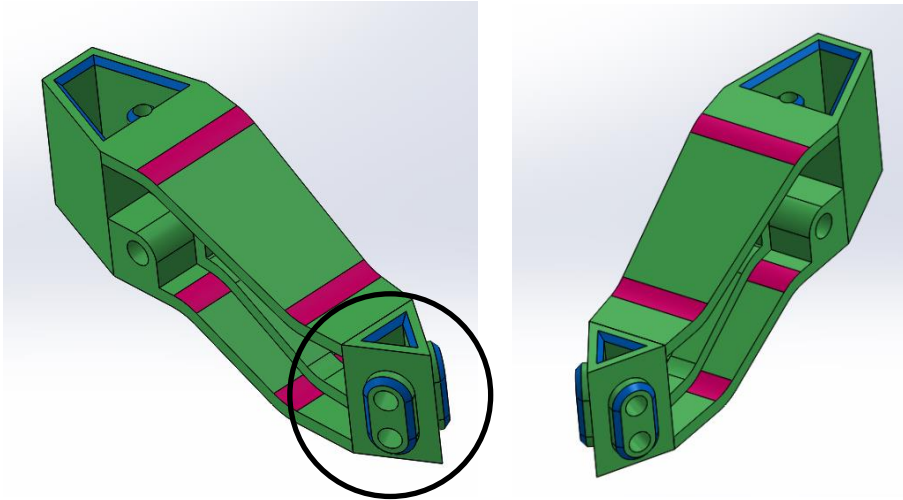
What is the mass of the part (grams)?

Enter values

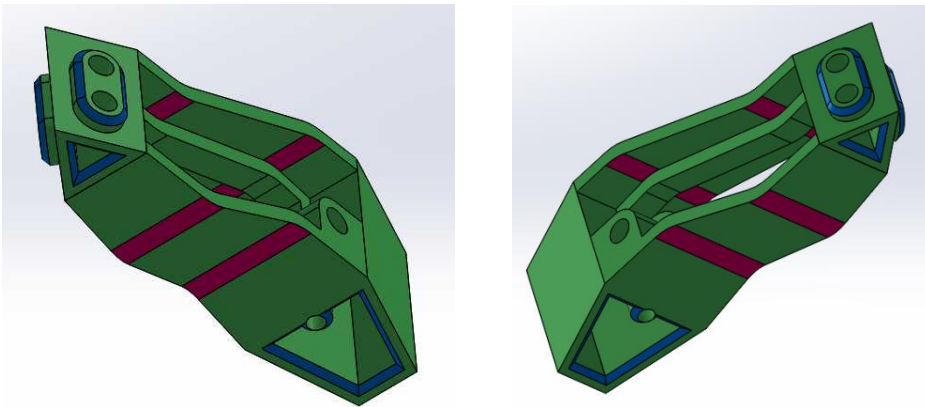
(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q11 of Exam Set 6 >>



Slot boss on both sides



Answer Sheet

EXAM SET 6

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	5	-
2	Stage1, Initial part creation	10	☐ 980.48
3	Stage1, Update parameters	10	1131.40
4	Stage1, Update parameters	10	877.81
5	Stage2, Part modification	10	☐ 270.87
6	Stage2, Update parameters	10	285.96
7	Stage2, Update parameters	10	269.75
8	Stage3, Part modification	10	☐ 277.71
9	Stage3, Update parameters	10	286.68
10	Stage3, Recovery errors	10	272.87
11	Stage3, Add features	10	301.16
	Total	105	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here
While **Fill-in-blank** type answer should be within $\pm 0.5\%$ of provided answers.

Review

- What's your score?
- Do you finish segment 1 test within 70 minutes? ☐ Yes ☐ No
- Do you pass segment 1 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Understanding drawings
 - ☐ Create base sketches
 - ☐ Using equations and linked values
 - ☐ Updating features
 - ☐ Modifying parameters
 - ☐ Time management

E N D o f E X A M S E T N o . 6

“A DREAM IS JUST A DREAM.
A GOAL IS A DREAM WITH A PLAN AND A DEADLINE”
- Harvey Mackay -



Lake House, created by the author 2018
SOLIDWORKS modeling with architectural rendering

Part 3

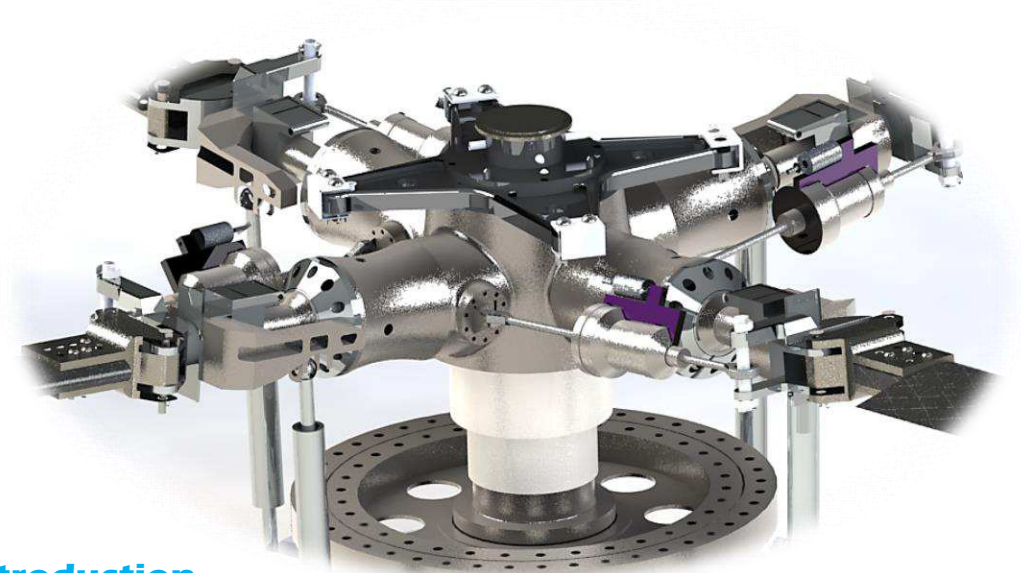
SEGMENT 2: Configurations

Segment 2 Exam

When you complete this chapter, you will learn and practice

- ▶ Creating configurations from other configurations
 - ▶ Changing configurations
 - ▶ Creation of configurations using a design table
 - ▶ Measuring mass properties
 - ▶ Changing features of an existing SOLIDWORKS part
-

3.1 Introduction of CSWP SEGMENT 2



Introduction

Rotor Assembly of UH-60 Helicopter

The second segment of the CSWP Core exam consists of **12 questions** that need to be completed within **50 minutes**. A minimum of 77 points out of 104 points is required to pass the segment 2. Two of them are just description questions. The answer format has two types: Multiple choice and Fill-in-blanks. This segment generally consists of two parts:

■ Part I: Configurations

Download a part file having a few configurations. Each question asks for a new one. Add a few features, suppress a feature and check the mass. It will not take long. Approximately 15 min would be good for this part. This work is for just checking whether a user is capable of modifying basic features and getting data within a short time.

■ Part 2: Design Intent

This part has to be started from a new part file. Open the download file, then the user is asked to make some various changes to sketches, move features from start conditions, modify some cuts and keep the overall design intent. There will be plenty of room for mistakes and errors. The remaining 25 min would be short for troubleshooting and rebuilding. The user must deduce the design intent from the problem statement.

Exam overview

The below table shows the overall process of segment 2. It would be helpful for you to get a big picture of the test. Most problems of segment 2 are about **configurations**. There are some questions about modifying **Shell thickness or 2D Profiles** using the design table. The most important part is mainly about an **understanding of design intent**.

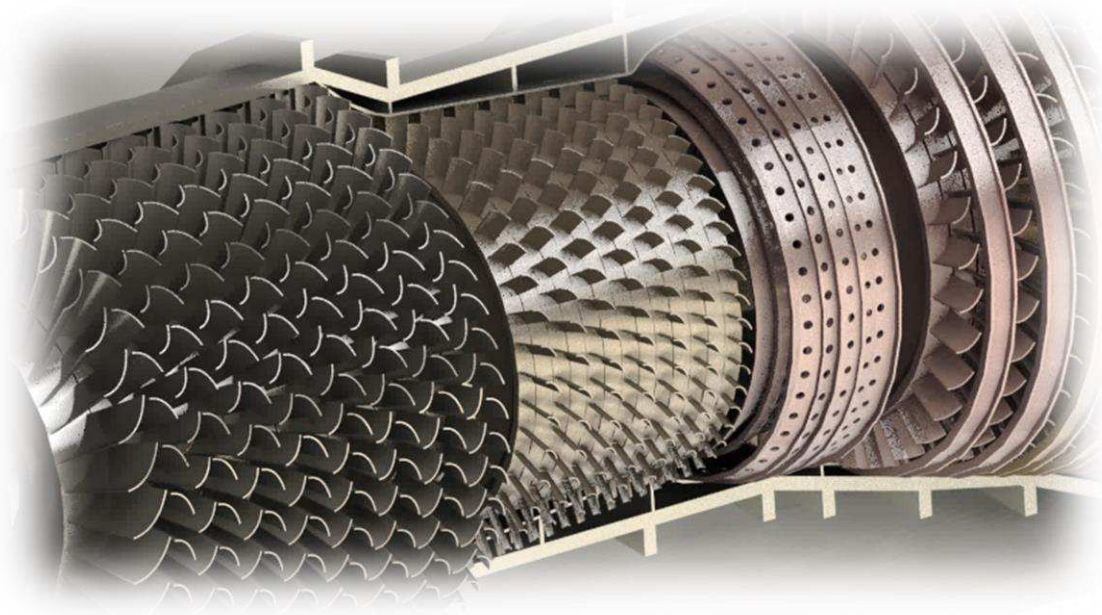
No	Description	Points	Answer type
1	Instruction	5	-
2	Modification of sketch or feature	9	Mass / Multi-choice
3	Modification of sketch or feature	9	Mass/ Fill-in-blanks
4	Remove feature	9	Mass / Fill-in-blanks
5	Remove feature	9	Mass / Fill-in-blanks
6	Add feature	9	Mass / Multi-choice
7	Add feature	9	Mass / Fill-in-blanks
8	No. of configuration	9	No. / Multi-choice
9	Modification of configuration(suppress/unsuppress)	9	Mass / Fill-in-blanks
10	Creating New configuration	9	Mass / Fill-in-blanks
11	Creating New configuration (design table)	9	Mass / Fill-in-blanks
12	Modification of feature using a design table	9	Mass / Fill-in-blanks
	Total	104	Pass points: 77

3.2 Mastering Topics for Segment 2 exam

When you complete this section, you should be able to:

Segment 2: Configurations (50 Minutes)

- Creating configurations from other configurations
- Changing configurations
- Mass properties
- Changing features of an existing SolidWorks part



Internal Structure of Gas Turbine Engine

Utilizing Configurations

In this chapter, we will look at the essential key skills needed to achieve high scores in Segment 2. In CSWP Segment 2, the problems with configurations are a total of 5~6 questions. Half of them are about handling the **configuration manager**, and half is about creating and modifying the configuration using the **design table**. The user has to use the configuration manager to add configurations, modify the part, and control the suppression state of features and dimensions.

Configurations are different versions of a part in which dimensions are changed, features are suppressed (turn off), and other characteristics such as color or custom properties can be managed. Configurations enable you to have these variations within a single part. In CSWP, the problems only ask **changing dimensions** and **suppressed/ unsuppressed features** in the configuration section. Sometimes, a material change could be included.

To practice the application of configuration, we will create 3 types of configuration in a single model. Create 3 versions of the configuration model and answer the questions by following the steps outlined below. During practice, you can get used to the format of the questions asked in the CSWP exam. SOLIDWORKS configurations are listed in the **Configuration Manager**. This is a tab at the top of the **Feature Manager** area as shown below :

- **Create a single part and define configuration 'A'**

First, create the simple part shown below. In the Property Manager, input the configuration name 'A'.

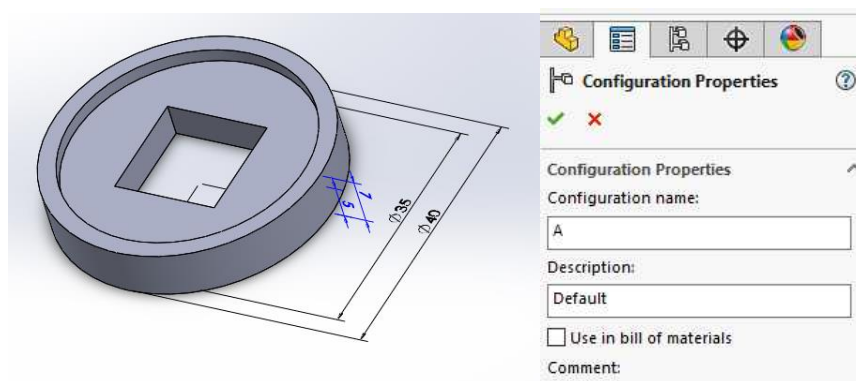
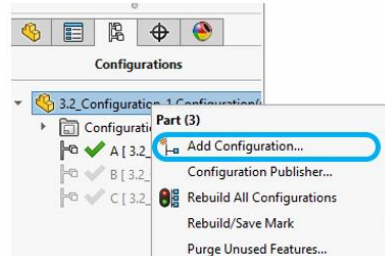


Figure 1 Simple model for Configuration Practice ➔ P3.2_Configuration_R1.SLDPRT

- Create configuration 'B' and 'C' based on the drawing.

To start creating additional configurations, we have to add it by going to the configuration manager on the design tree, then RMB on configurations and select Add Configuration, as shown in the below image.



Create two configurations **B** and **C** as shown below. In the **A configuration**, the shape of the center space is changed to a circle, and in the B configuration, the dimension of the center circle is increased and the chamfer is added to the outer edge.

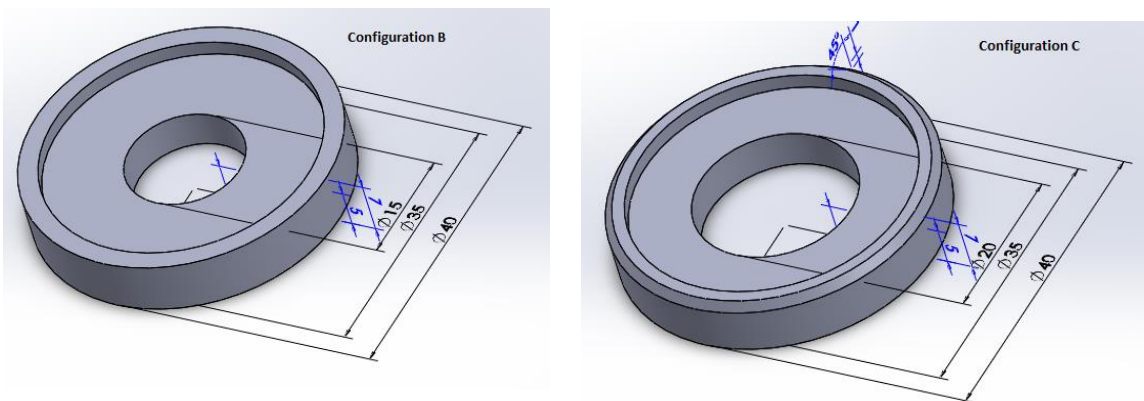


Figure 2 Configuration B and C dimensions

There are various ways to create Configuration B. This section focuses on the method used in the CSWP exam. First, go to the Design Tree of configuration A, do RMB in the corresponding 'Cut-Extrusion' and click **Configure Feature**. In Configuration B and C, removes the feature by suppressing it. Then, go back to the design tree and create a circular center hole in configuration B.

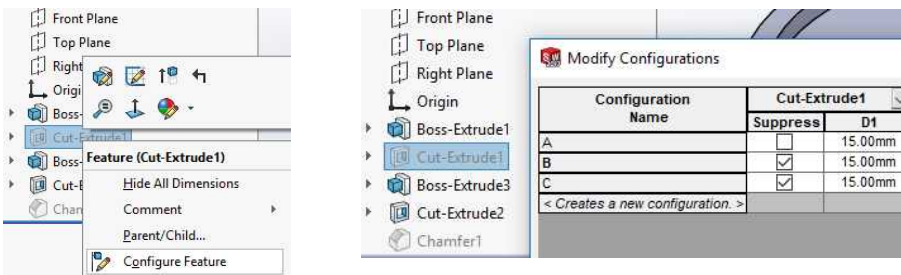


Figure 3 Feature suppressing

In Configuration B, you can select the configurations option during the task that creates the circular hole in the center. **This configuration, all configuration, or Specify configuration.** This feature is only for Configuration B currently being worked on, so choose ‘**This configuration.**’ Go to the design tree and select **Configure Feature** on the center hole feature and select suppress for Configure A.

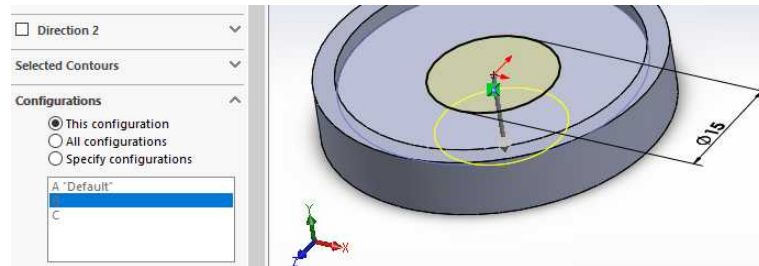


Figure 4 Configure Feature 'B'

Go to configuration C and increase the dimension of the center hole to 20mm. Again, set this configuration to ‘**This configuration**’.

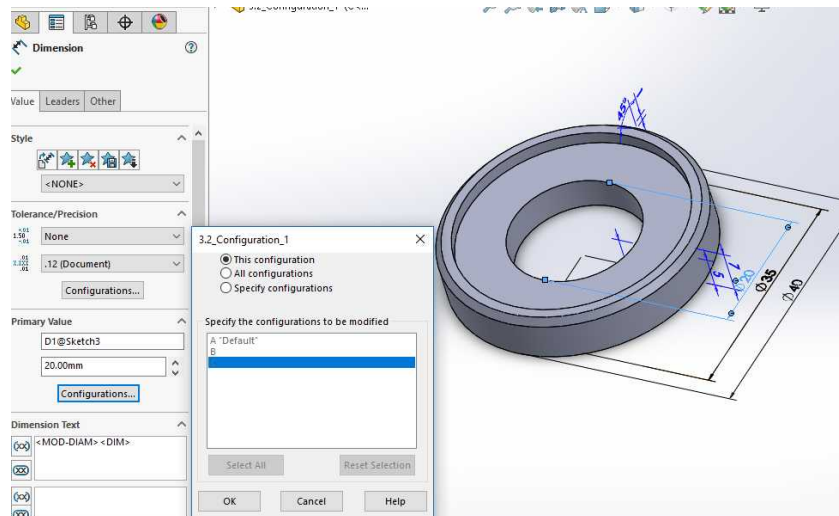


Figure 5 Configure Feature 'C'

Create a chamfer on the outer edge and likewise suppress configuration A and B in the configure feature.

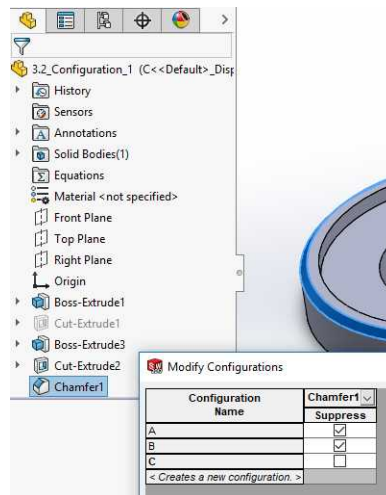


Figure 6 Configure feature chamfer

There is another option for creating configurations. Derived configurations are configs that are dependent on other configs. You can create them from RMB on a configuration, and they appear indented underneath the parent config. Derived configuration maintains the same values and properties of the parent config unless you break the link to the derived (child) config by explicitly changing a value in the child config. The derived config value also changes when the parent config value changes. Basically, the CSWP segment 2 exam doesn't cover these derived configuration topics. However, it's very useful to create a more complex design based on the parent config for rendering, product demonstration and documentation purposes.

This completes the exercise in creating three different configurations for a single model. It is a good practice to use configuration manager and **suppress/unsuppress** option for some features. CSWP exam evaluates your ability to suppress/unsuppress features to set them different configurations. When modifying dimensions on existing features or sketches, we have to select the scope in terms of which configurations the adjustment will apply to. This will consist of 2-3 questions in segment 2. The remaining questions are related to working with design tables, which is another method that will enable us to create different configurations.

This section deals with a part configuration for CSWP exam preparation. The Configurations are variations of a part in which dimensions are changed, features are suppressed, and other items such as color, material or custom properties can be controlled. Thus, Configurations are widely used in the product design phase in many industries. Also, assemblies can have configurations that can control more parameters. Changing dimensions and suppressing or unsuppressing features are the most commonly used techniques available through configurations.

Utilizing Design Tables

A design table is a great way to speed up the configuration process. Design tables will allow us to create different variations of a 3D model. However, unlike directly setting up configurations, the design table enables us to adjust multiple dimensions and state of the feature altogether. Using design tables can sometimes be confusing. As it relates to the CSWP exam, we need to learn how to create a design table and use it to generate multiple configurations at the same time.

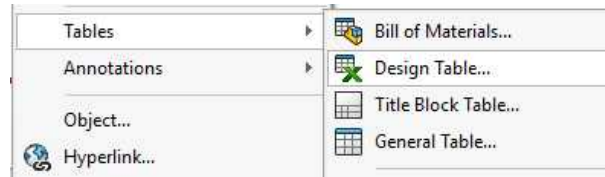


Figure 7 Design Table creation

Create a part using the following drawing. If you're looking at a color printed book, you'll see a purple dimension line. These dimensions are used as a variable parameter in the design table. Create a simple model like this and save the model.

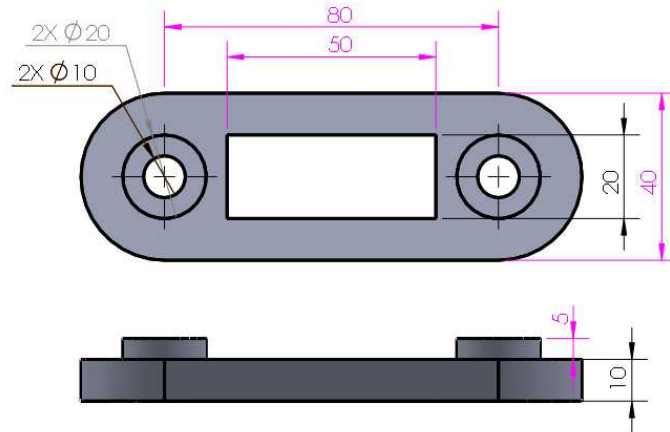


Figure 8 Simple model for design table practice [P3.2_DesignTable_R1.SLDPRT](#)

When creating the model, enter the simple dimension title name which is easy-to-identify as shown below:

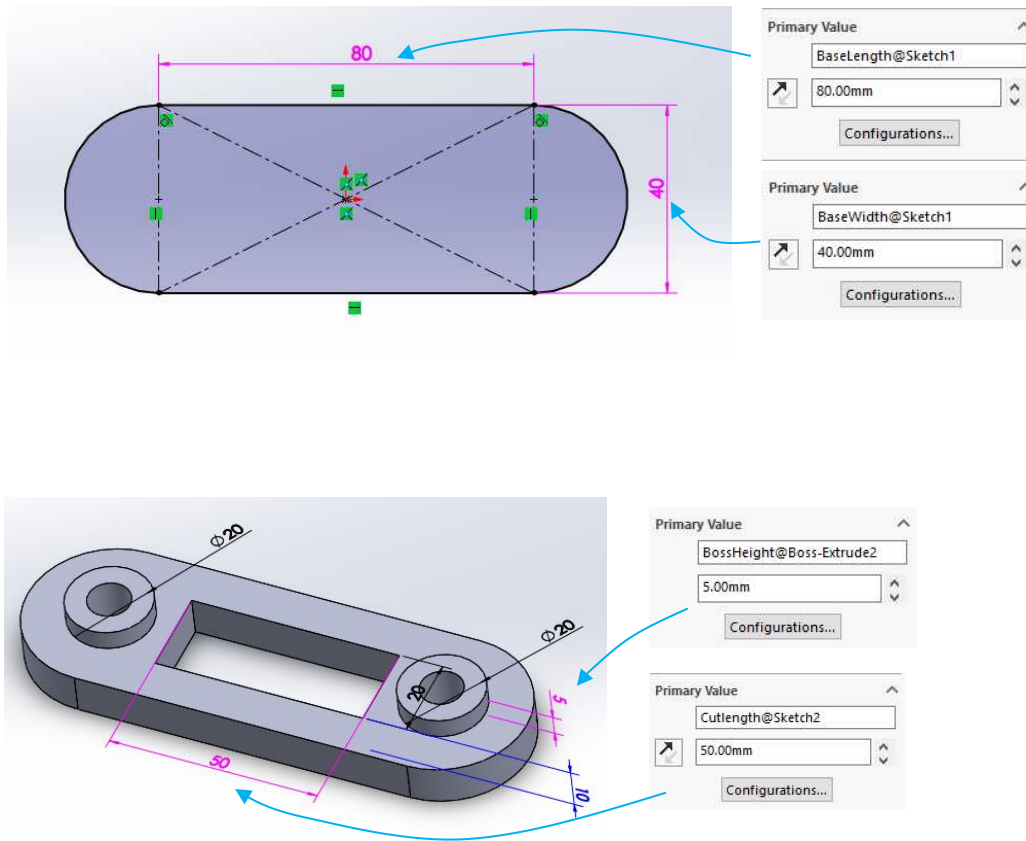


Figure 9 Dimension titles

By changing these four dimensions using the design table, we shall create four configurations as follows:

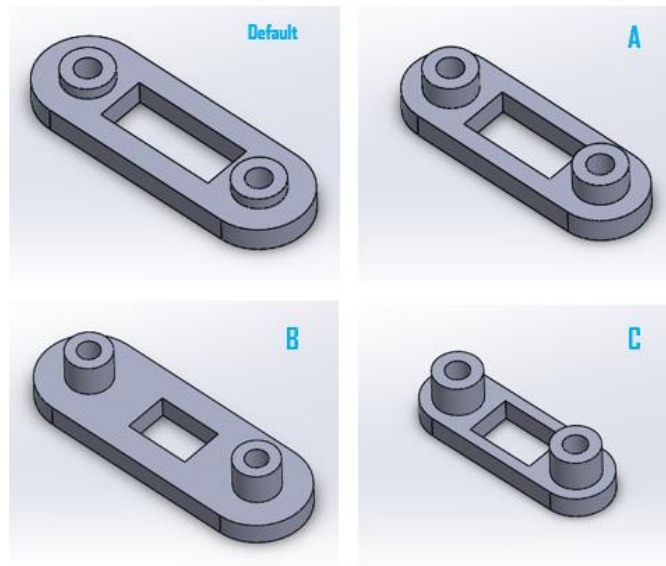


Figure 10 Design Table Driven Configuration models

Once a model is complete, you can insert a new design table by going to **Insert** → **Table** → **Design Table** and leave the option to default to create an Excel sheet. SOLIDWORKS is smart enough to automatically recognize sketches you have created during the modeling process. A pop-up box will appear asking which dimension to use to create the configuration. You can easily find the four variables created earlier. Select these and click Ok.

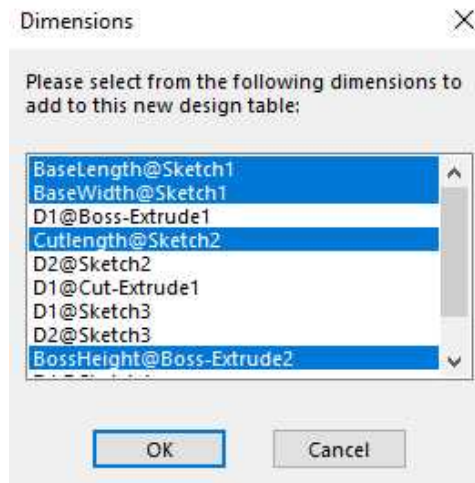


Figure 11 Dimension selection

Select the desired dimension and click OK. Then, the design table is created as shown below:

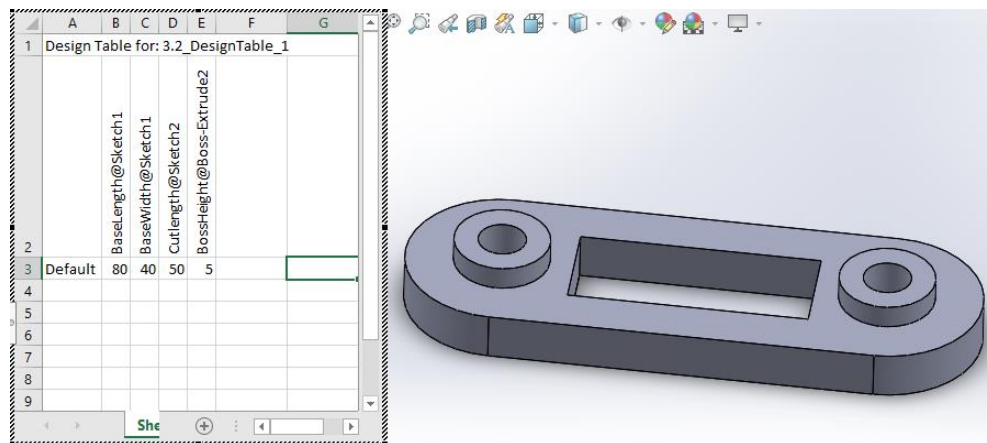


Figure 12 Generated design table

Fill in the design table as shown in the below screenshot. The first column in the table shows the name of the configuration, while the others show dimensions. Click outside the Excel sheet to confirm the table and create four configurations. In the CSWP test, there

will be a couple of questions that you need to create configurations using the design table and choose one of the created configurations to measure the mass.

	A	B	C	D	E	F	G
1	Design Table for: 3.2_DesignTable_1						
2		BaseLength@Sketch1	BaseWidth@Sketch1	CutLength@Sketch2	BossHeight@Boss-Extrude2		
3	Default	80	40	50	5		
4	A	70	35	40	10		
5	B	90	45	30	15		
6	C	60	30	30	15		
7							

Figure 13 Adjusting design table

Another type of problem using design tables is the control of the **Suppress / Unsuppress state**. To add the state of the feature to the design table, select the first empty title cell, then double-click on the feature on the design tree. In this exercise, we shall suppress the circular holes in both sides of the **configuration C** using the design table. To adjust the status of the feature, just enter ‘**U**’ (unsuppressed) or ‘**S**’ (suppressed). An alternate way is to input **0** (unsuppressed) and **1** (suppressed).

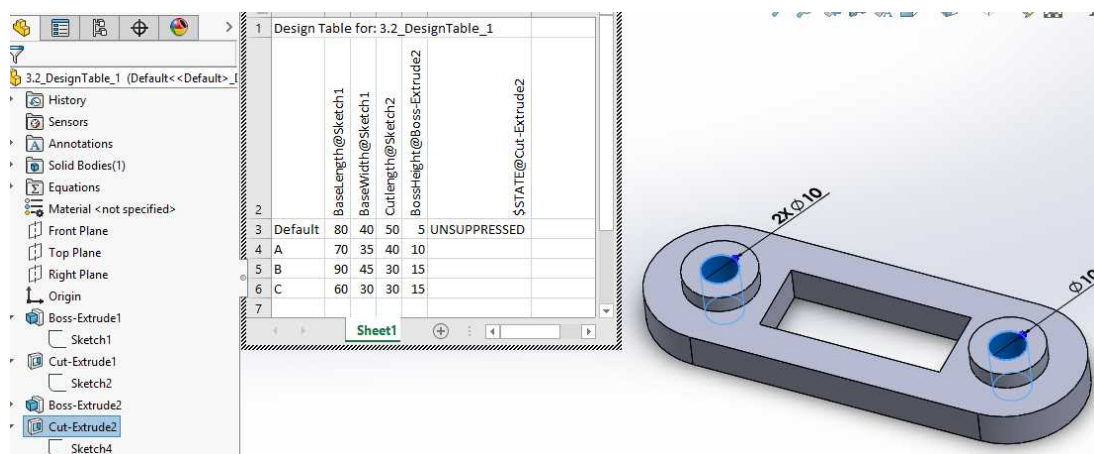


Figure 14 Insert feature state variable in the empty cell of the design table

Adjust the design table as shown in the screenshot below. Then, if you check configuration C, you can see that both holes are suppressed. The problem of controlling the state and dimension of the feature, using the design table comes up with 2 to 3 problems in Segment 2. Learning the basics usage of configuration and design tables can help you solve half of the problems in segment 2.

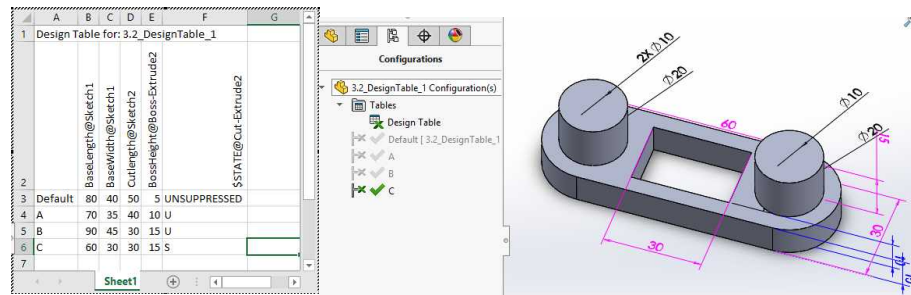


Figure 15 Control of feature state

In this part, it covers how to create different configurations of a specific model and how to directly create multiple configurations using design tables. If you learn exactly how to use these configurations and design table tools, then Segment 2 will be the easiest test among three segments. Given that it only takes 40 minutes, you can expect that it won't take much time and effort to complete.

Hands-On Practice Configurations #1

- Practice time: 20 min
- Unit: MMGS (decimal digit 2)
- Instruction:
 - Open the provided model file ➔ P3.2_Configuration_1_Initial.SLDPRT
 - Check the number of configurations
 - Create configuration X based on configuration B
 - Modifying configuration X by adding a feature and suppress it on configuration A, C
 - Switch to config C and modifying cut profile as shown below images. Suppress it on configurations B and X
 - Assign material 1060 Alloy for call configurations
 - Measure mass of configuration A, B, C, and X
- Answer
 - 4 configuration
 - Check the provided solution model
 - Mass of Configurations: A=78.75, B=81.37, C=67.73, D=81.37grams

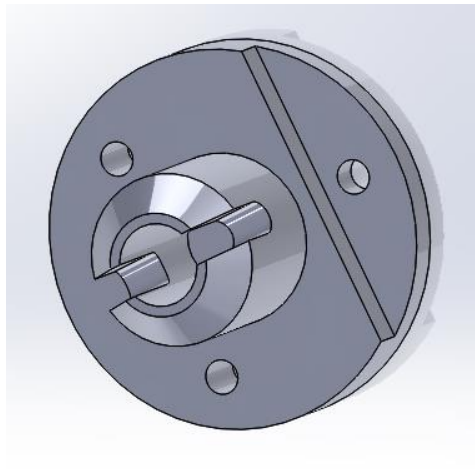


Figure 17 Configuration Practice ➔ P3.2_Configuration_No1_Initial.SLDPRT

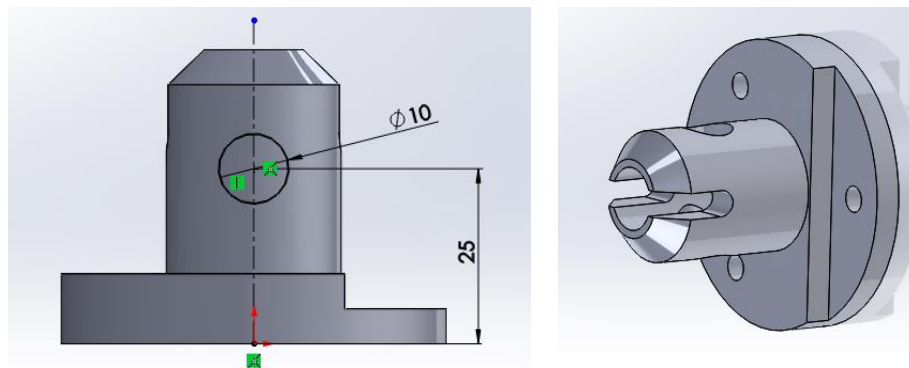


Figure 16 Configuration X modification

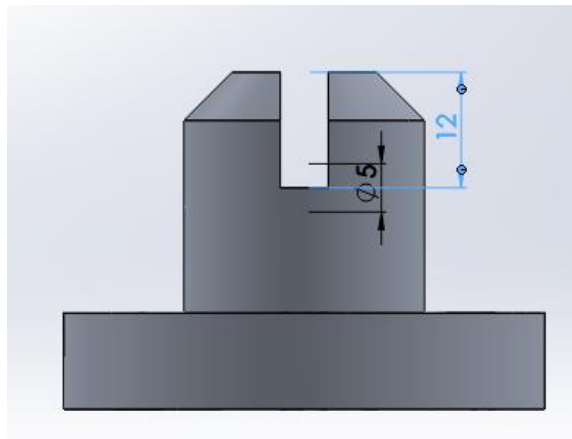
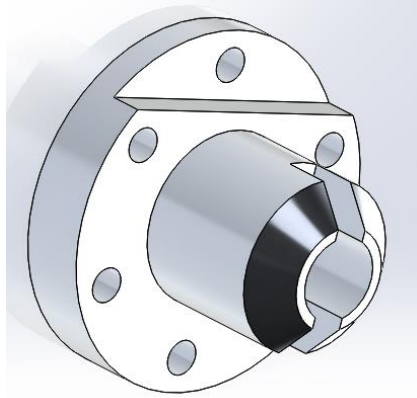


Figure 18 Configuration C modification

Hands-On Practice *Design Table #1*

- Practice time: 20 min
- Unit: MMGS (decimal digit 2)
- Instruction:
 - Open the provided model file ➔ P3.2_DesignTable_1_Initial.SLDPRT
 - Create a design table using the 'Auto-create' option
 - Create a new configuration 'F' by copying the row of configuration 'C' in the design table and pasting a new row.
 - Change the following parameters in the design table for configuration 'F' to the following specified values:

D4@sketch1: 14
D1@Boss-Extrude2: 32
D1@CirPattern1: 4
 - Switch to configuration 'F' and measure mass
- Answer
 - Mass of Configuration 'F': 20.01 grams

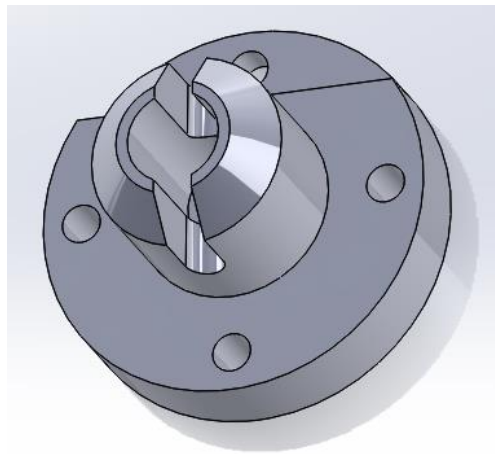


Figure 19 Design Table Practice (configuration F) ➔ P3.2_DesignTable_No1_Final.SLDPRT

Understanding Design Intent

If you don't have enough experience with solid modeling, you may have not heard the term ***Design Intent*** frequently. Even though, if you are experienced in SOLIDWORKS, users still wonder what it means, or how it pertains to design? The ***design intent*** is a method used in CAD that defines the relationship between sketches and features so that a change to one propagates automatically to others. Design is a process of constant change and iteration, especially in mechanical components. The design intent is how you wish to design or model to be, even if it's changed or constantly evolved. So, designers have to think ahead and build design intent into their model.

The second half of Segment 2 is about design intent. (In the revised exam form, design intent problems were presented at the beginning part.) From there, the exam evaluates the ability of the test taker to edit the model as effectively as guidelines while maintaining the design intent. When you use SOLIDWORKS, you typically create a part once but it needs to be edited many times. Design intent, in other words, ***design for change*** is at the core of most CAD tasks.

In Segment 2, various levels of problems are presented, ranging from basic editing to complex editing. Basic editing is simply a matter of increasing the thickness or adjusting the width. The overall flow of the problem dealing with design intent is as follows. When observing the drawing presented below, it can be recognized that the designer's design intent is a symmetric design relative to the long axis along with the slot. If the material is set to 2014-T6 and the mass is measured after modeling, it is calculated as 28.16gram.

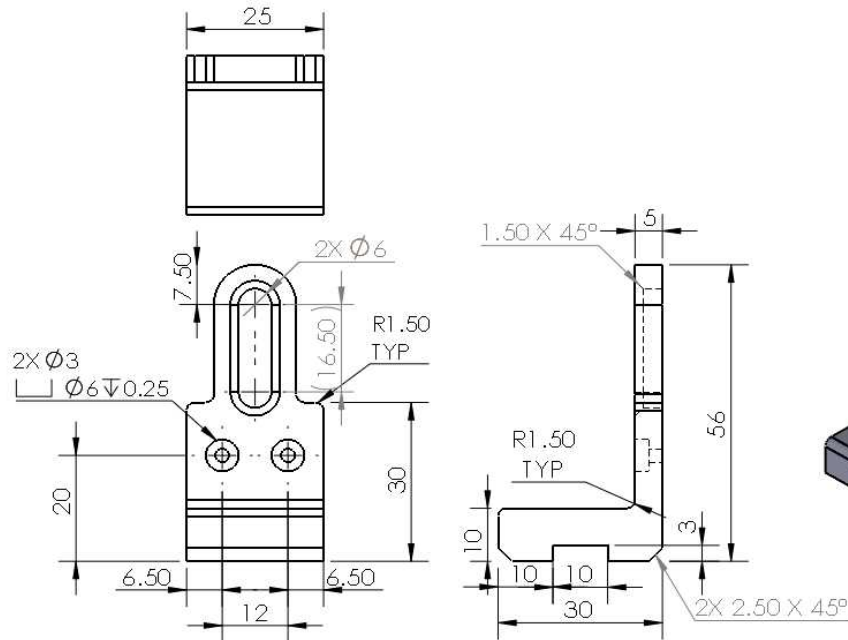


Figure 20 Design Intent example model [P3.2_DesignIntent_R1.SLDPRT](#)

The first part of CSWP's design intent begins with changing a single dimension of simple parameters such as thickness, height, width, and angle. Try to reduce the bottom wall thickness of the provided part from 10mm to 5mm. The design intent is that the overall height of the slide bracket (56mm) does not change. If the overall height would change, i.e. when changing the bottom wall thickness, it would be poorly designed. The mass of the resulting part is 19.41 grams.

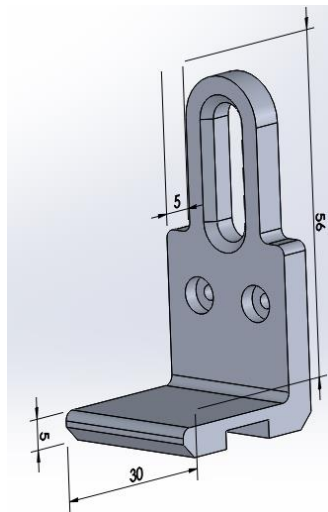


Figure 21 Design intent example (reduction in thickness) [P3.2_DesignIntent_R1.1.SLDPRT](#)

Next, try to change the positions of the holes as follows: dimension 'A' →10mm, dimension 'B'→15mm. Changing the locations and dimensions of a feature is also frequently asked the type of questions. Mate conflicts associated with existing mates may cause warnings or errors as a result of the modification. Problems that induce conflicts with existing geometric relations and fixing such warnings or errors are also common problems occurring in segment 1.

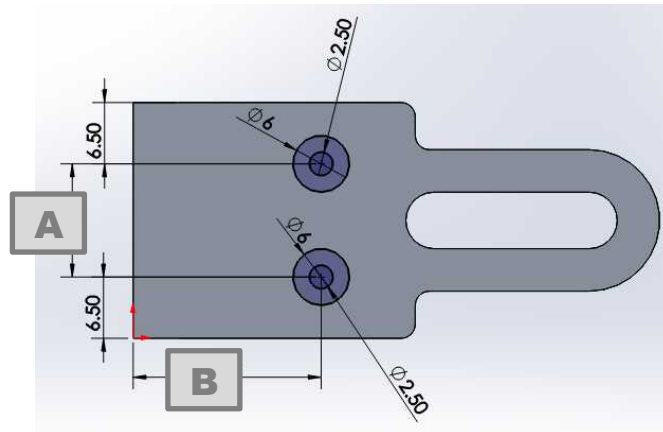


Figure 22 Design intent example (Modification of feature locations) P3.2_DesignIntent_R1.2.SLDPRT

Modifying the base sketch as follows is also a frequently asked question type. The mass of the resulting part is 20.67 grams.

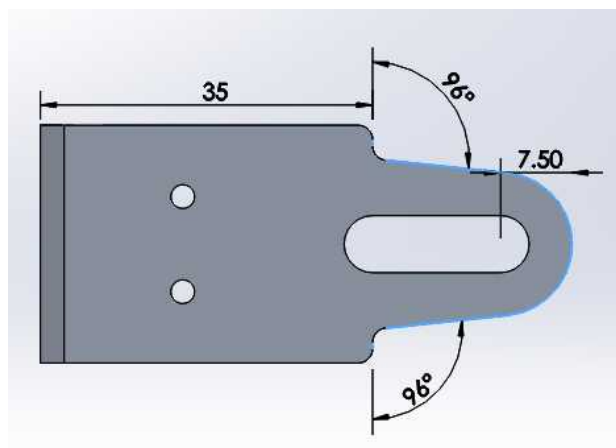


Figure 23 Design intent example (Modification of sketch profile) P3.2_DesignIntent_R1.3.SLDPRT

Why design intent is so important? It could minimize the additional work hours if there's a need to update the model's geometry and parameters. Some CAD users say that solid modeling is 90% design intent and 10% knowing the program.

Hands-On Practice *Design Intent #1*

- Practice time: 20 min
- Unit: MMGS (decimal digit 2)
- Instruction:
 - Open the provided model files.
 - Step1. Increase flange thickness 2mm→3mm
 - Step2. Decrease the angle 30 degree→ 25 degree
 - * If errors occur during rebuild, then fix them to modify the angle correctly.
 - Step3. Modification of the outer cylinders
 - Step4. Add additional flange feature.
 - Measure mass of each modification step.
- Answers: Step1- 180.07 grams, Step2&Step3-175.03 grams, Step4-177.35grams

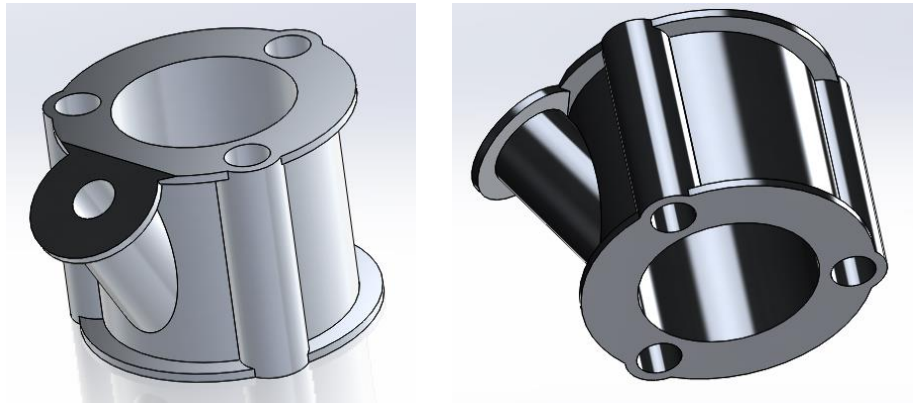


Figure 25 Design Intent Practice  P3.2_DesignIntent_NI_Initial.SLDPRT

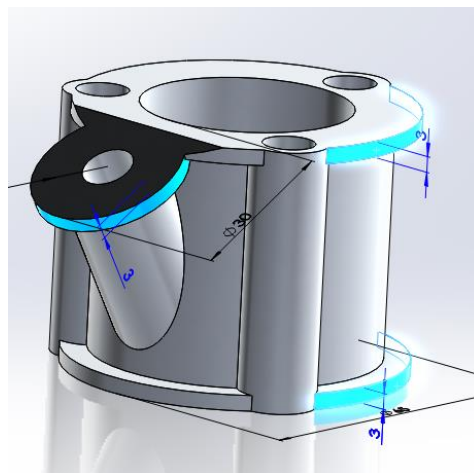


Figure 24 Design intent practice (Step 1 resulting part)  P3.2_DesignIntent_NI.1.SLDPRT

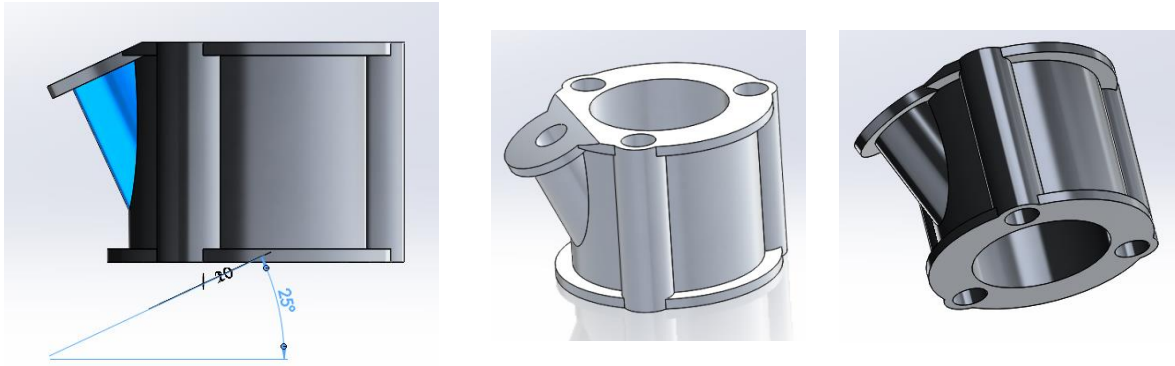


Figure 26 Design intent practice (Step 2 resulting part) ➔ P3.2_DesignIntent_NI.2.SLDPRT

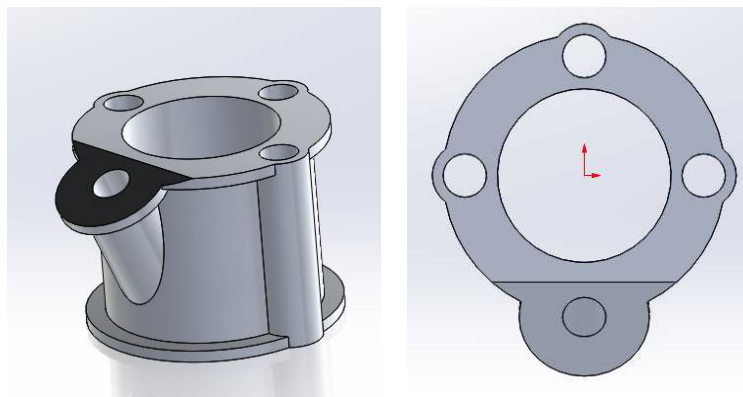


Figure 28 Design intent practice (Step 3 resulting part- 3 outer cylinders /90 degree) ➔ P3.2_DesignIntent_NI.3.SLDPRT

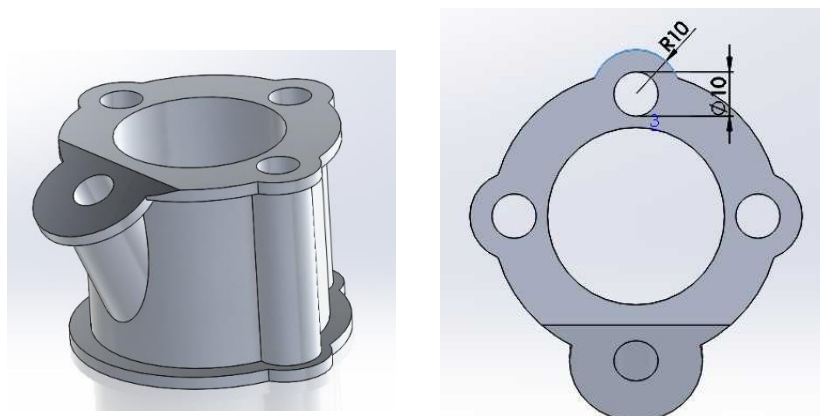


Figure 27 Design intent practice (Step 4 resulting part- additional flange) ➔ P3.2_DesignIntent_NI.4.SLDPRT

Common Mistakes

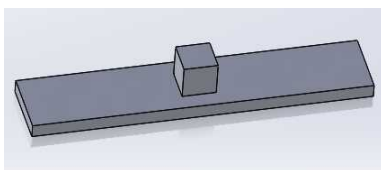
Here are some common mistakes often made in Segment 2. In the Configuration section, if you are familiar with the basic features of the Configuration Manager, there is not much chance that you can make a mistake. You will use the configuration manager to add configurations, modify the part, and also control the suppression state of features and dimensions. That's all for configuration section problems.

1. Lack of Understanding of Configurations

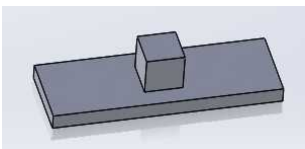
Problems handling the Configuration are straightforward, so there is no room for doing a big mistake. However, since suppress and unsuppress control can be a bit confusing, it is good to check whether the feature is suppressed in **Feature Manager** after following the suppress control in Configuration Manager.

2. Misunderstanding of Design Intent

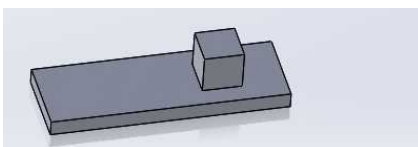
When you modify the part parameter, it's better to consider the correct design intent. Design intent can be better understood simply by reversing the order of those words as 'Intended design'. Take for example cube on the wide strip. The design mandates a cube to be created at the center of strip width. If you model the design by dimensioning a hole of half-width from the edge, it is indeed in the center of the strip, but you have ignored the design intent of the cube location. If the design update is carried out on the width of the strip, the cube would locate on half-width of the initial width and is no longer at the center of the strip. You need to capture this kind of design intent from the problem description in segment 2.



Cube is centered on strip (design intent)



Cube is centered after modification of strip width



If cube is dimensioned from the edge (ignoring design intent)

Figure 29 Example of design intent  P3.2_DesignIntent_R3.SLDPRT

3. Mistakes in dimensioning

Although the portion of part modeling is less than that of Segment 1, there are still multiple problems to modify the dimensions of sketch profiles or features. In these cases, you can still make a mistake with correct dimensioning. There is only one solution for these mistakes, look thoroughly the drawing information.

If you complete the test, you will get a scorecard as shown below. A Scorecard sample of the marks obtained by the author who took the exam in 2018 is as shown below:

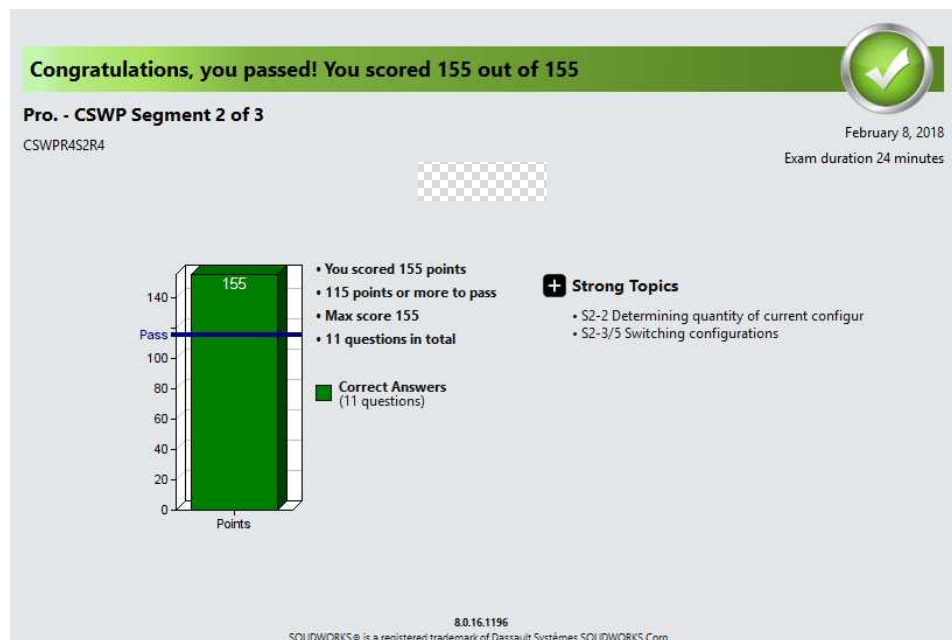


Figure 30 Scorecard screenshot example

3.3 Walkthrough: Practice Exam Set 1

In this section, you will walkthrough a sample exam that has an almost identical format of the actual exam. Below is the sample exam document. Readers should verify the analysis before trying out the solution after the sample review paper.

In this segment, you will be evaluated on the following skills:

- Creating various configuration from the existing configuration setup.
- modifying the configurations using a design table.
- Measuring the mass of the modified various configuration.

CSWPR4 Segment 2: Examination Information

Examination Information

Welcome to Segment 2 of the CSWP Core Exam

- This test is made up of a series of problems broken down into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set.
- You must use at least SolidWorks 2008 for this exam. Any use of a previous version will result in the inability to open some of the testing files.
- Your exam is: 11 questions.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have 40 minutes to complete this examination.
- Minimum passing score is: 115 points.
- Your proctor is: Virtual Tester Online

Press the Start Examination button to continue.

Start Examination

Question 1 of 11

For 0 point:

Part Configuration Problem Set Description

This text describes the problem that must be solved in this problem set.

You will be downloading an existing part and modifying its geometry based on the use of configurations.

You will be asked to do the following:

- Analyze existing configurations correctly
- Modify geometry
- Modify existing configurations
- Create new configurations

Please select **Yes** and **Continue** to the next question.

Yes

Continue

Question 2 of 11

For 10 point:

Existing Configuration

Unit system: MMGS (millimeter gram, second)

Decimal places: 2

- Open existing part model.
- Determine how many existing configurations there are in the part.

Attachment to this question

Open: stage1_initial_part.SLDPRT

☐ 4

☐ 3

☐ 5

☐ 6



Continue

Question 3 of 11

For 10 point:

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: Cast Alloy Steel

Density: 7300kg/m³

- Switch to configuration B
- Measure the mass of the part
- What is the mass of the resultant part?

Enter value:

(use . (point) as decimal separator)



Continue

Question 4 of 11

For 15 point:

Create configuration X

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

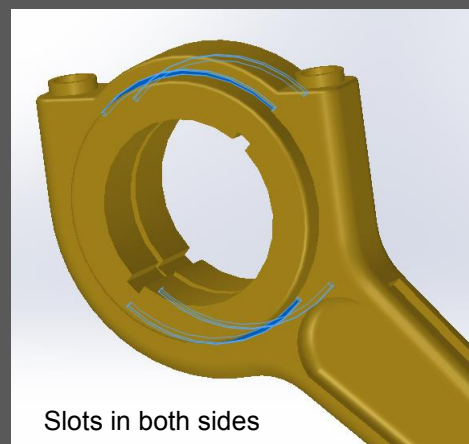
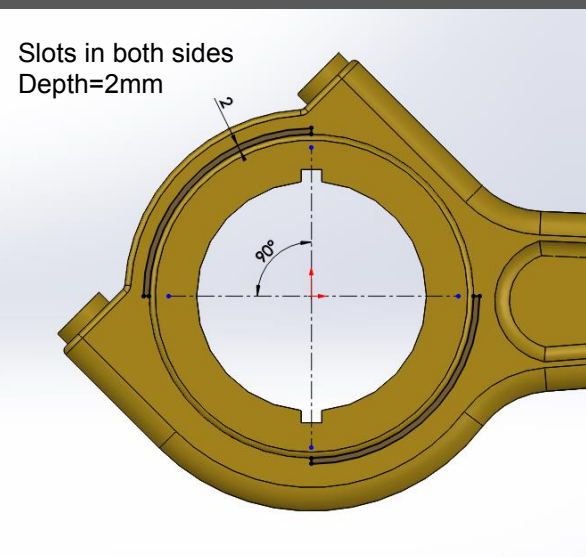
Material: Cast Alloy Steel

Density: 7300kg/m³

- Create new configuration named **X** based on configuration **A**.
- Create a **balance tab slot** as indicated in the image that will be suppressed in all other configurations except for **X** and **C**. (In other words, in configuration **X** and **C** this new feature will be unsuppressed)
- Remaining in configuration **X**, measure the mass of the part.

Enter value:

(use . (point) as decimal separator)



Continue

Question 5 of 11

For 15 point:

Create configuration C

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: Cast Alloy Steel

Density: 7300kg/m³

- Switch back to configuration C.
- Measure the mass of the part

Enter value:

(use . (point) as decimal separator)



Continue

Question 6 of 11

For 15 point:

Design Table

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: Titanium Ti-5Al-2.5Sn Annealed (SS)

Density: 4480kg/m³

-Remain in configuration 'C'

-Create a design table using the 'Auto-create' option

-Create a new configuration 'Y' by copying the row of configuration 'C' in the design table and pasting a new row.

-Change the following parameters in the design table for configuration 'Y' to the following specified values:

D3@Sketch1	315
D3@Sketch2	175
D3@Sketch4	62
D1@Sketch9	84

* Note: some parameters need to be found manually (dimensions in equations)

-Switch to configuration 'Y'

-Set material of configuration 'Y' to be Titanium (Ti-5Al-2.5Sn Annealed).

-Measure the mass of the part.

What is the mass of the part (grams)?

Enter value:

(use . (point) as decimal separator)

Continue

Question 7 of 11

For 0 point:

Modify existing part problem set

Description

This text describes the problem that must be solved in this problem set.

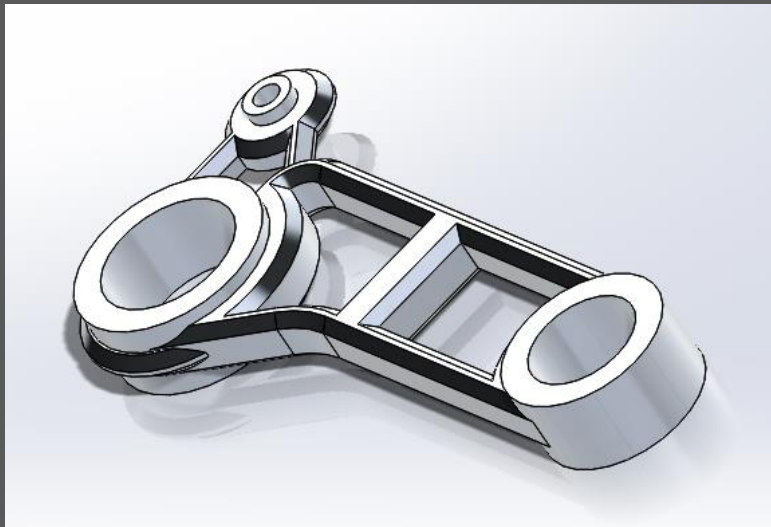
You will be downloading an existing part and modifying its geometry through modification of its existing features and parameters.

You will be asked to do the following:

- Modify feature parameters
- Modify sketch planes

Please select Yes and continue to the next question.

Yes



Next Question >

Question 8 of 11

For 20 point:

Change dimensions

Change the height of the cylindrical end of the handle.

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

- Open the attached part.
- Modify the starting part by changing the height of the both cylindrical ends from 15mm to **12mm**. The resultant part is labelled as Part B in the images.

* Note: The part before the modification is labelled Part A and the part after the modification is labelled Part B. (See images)

No other parameters or feature dimensions will change.

- Measure the mass of the resultant part

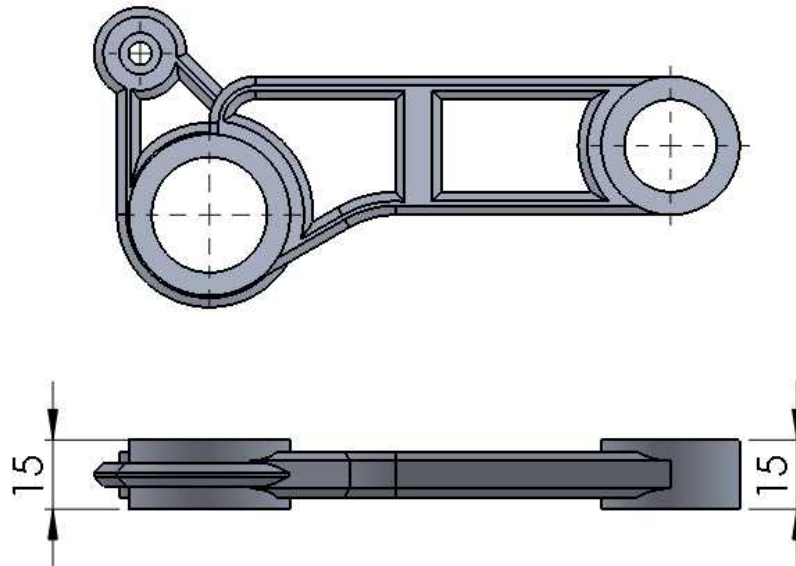
What is the mass of the resultant part (grams)?

Enter value:

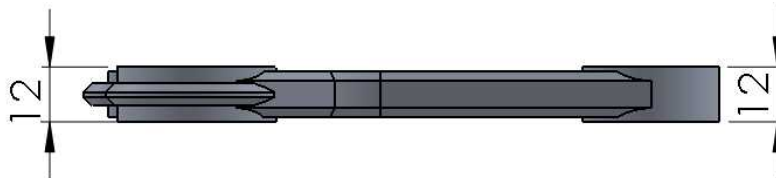
(use . (point) as decimal separator)

Continue

Reference Image for Q8 of Exam Set 1 >>



Part A



Part B

Question 9 of 11

For 20 point:

Modify Features

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

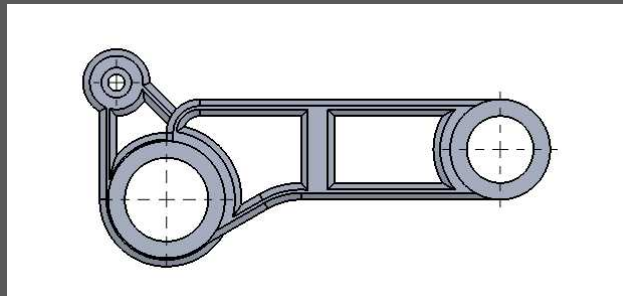
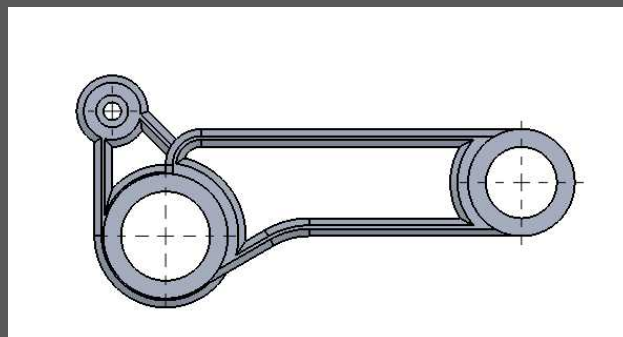
Material: 1060 Aluminum Alloy

- Remove the center bar between beams connecting both cylinder ends
- No other parameters or feature dimensions will change.
- Measure the mass of the resultant part.

What's the mass of the resultant part? (grams)

Enter value:

(use . (point) as decimal separator)

**Part A****Part B**

Continue

Question 10 of 11

For 25 point:

Intermediate Modifications

Modify profiles and add features

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

- Modify the location of the mounting hole position toward left direction (See images)
 - Add oil circulation slots inside of both cylinders. (See images)
 - No other parameters or feature dimensions will change
- *Note: The dimension of mounting hole is measured from the center of left cylinder. It could be modified at the sketch of the mounting hole feature.

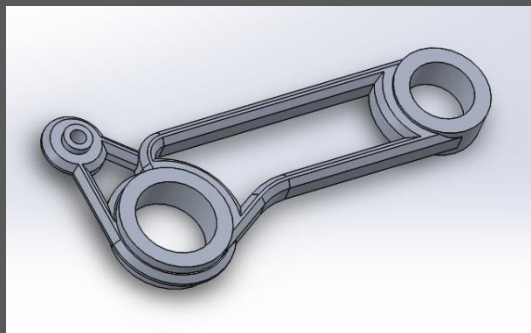
-Measure the mass of the resultant part.

What's the mass of the resultant part? (grams)

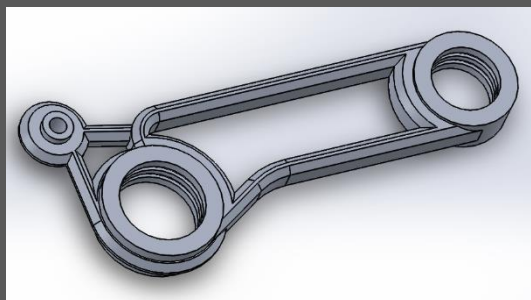
Enter value:

(use . (point) as decimal separator)

Part A

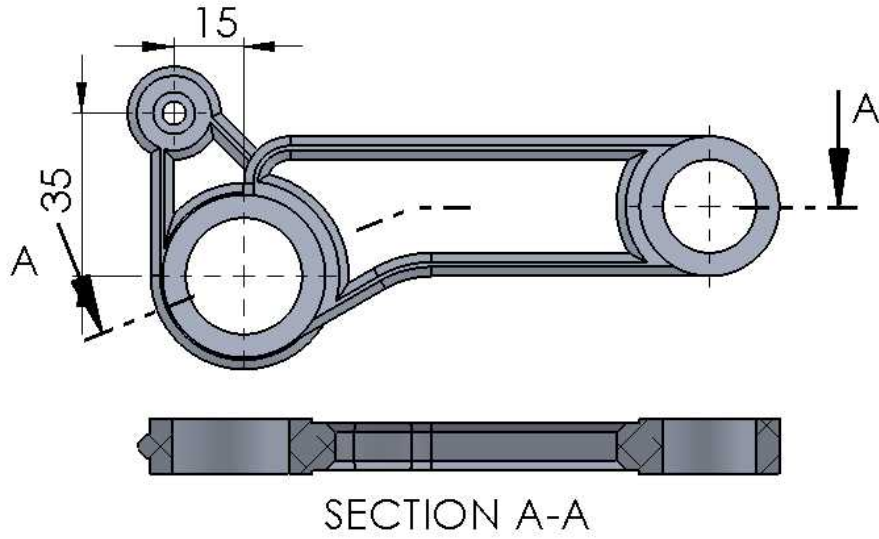


Part B

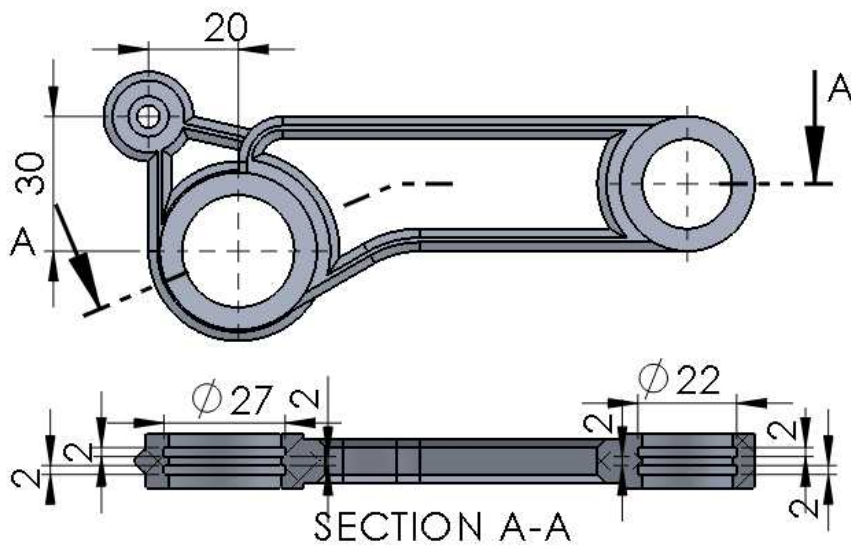


Continue

Reference Image for Q10 of Exam Set 1 >>



Part A



Part B

Question 11 of 11

For 25 point:

Final modifications

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

-Modify the lower connecting link between cylinders. (see images)

-Modify the thickness of the mounting hole cylinder. (see images)

-No other parameters or feature will change.

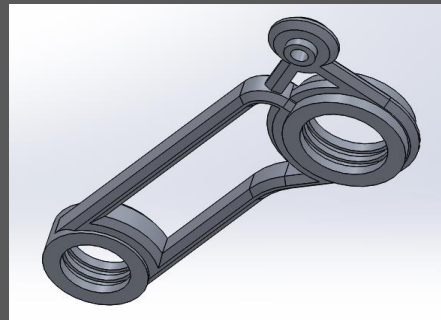
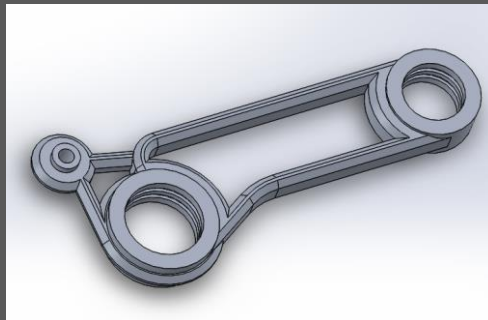
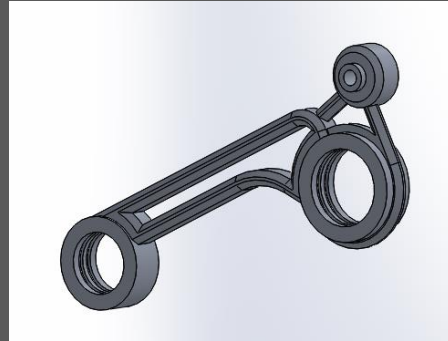
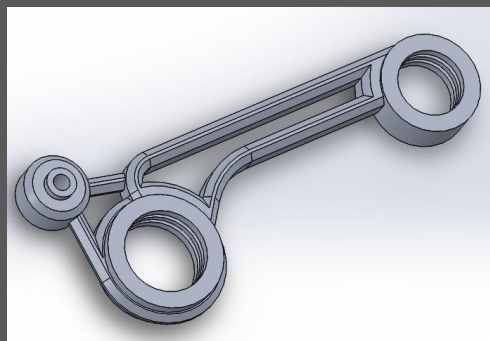
*Note: The part before the modification is labeled Part A and the part after modification is labeled Part B.

-Measure the mass of the resultant part.

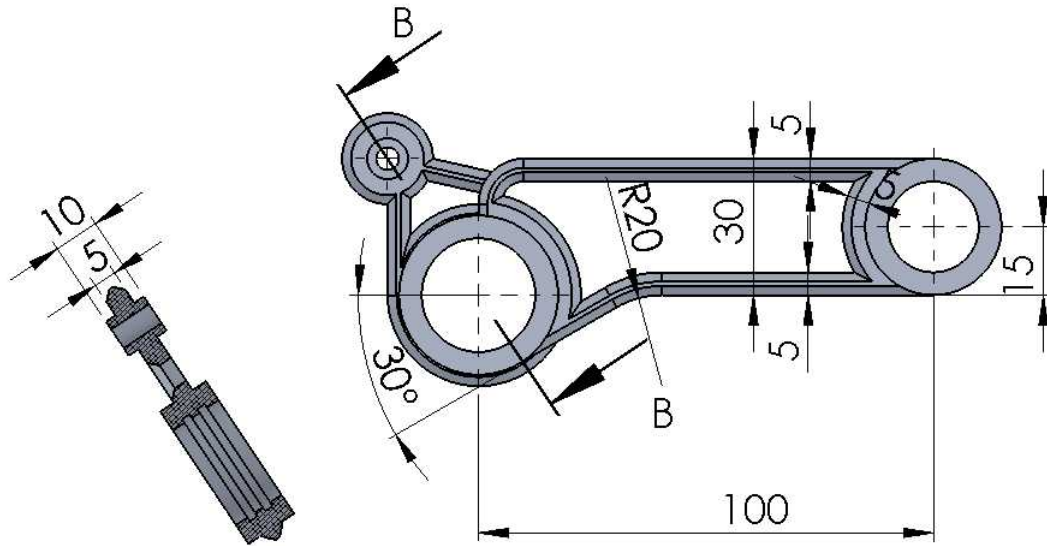
What's the mass of the resultant part? (grams)

Enter value:

(use . (point) as decimal separator)

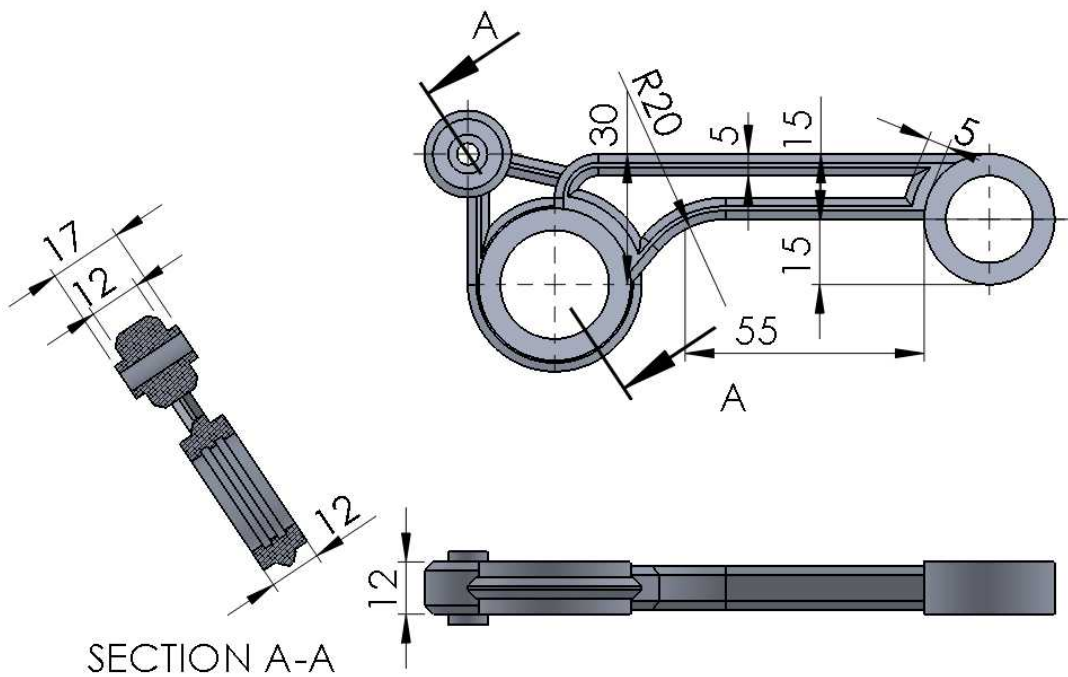
Part A**Part B**

Reference Image for Q11 of Exam Set 1 >>



SECTION B-B

Part A



SECTION A-A

Part B

Answer Sheet

EXAM SET 1

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Check configuration number	10	☐ 3
3	Change configuration	10	5193.11
4	Create configuration X	15	6154.97
5	Change configuration	15	5453.07
6	Design table	15	3334.23
7	Information	0	-
8	Change dimensions	20	66.86
9	Modify features	20	61.74
10	Intermediate modifications	25	59.97
11	Final modifications	25	61.49
	Total	155	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 3\%$ of provided answers.

Review

- What's your score?
- Do you finish segment 2 test within 40 minutes? ☐ Yes ☐ No
- Do you pass segment 2 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating configuration
 - ☐ Understanding design intent
 - ☐ Using design table
 - ☐ Modifying feature
 - ☐ Repairing warning and error
 - ☐ Creating feature

E N D o f E X A M S E T N o . 1

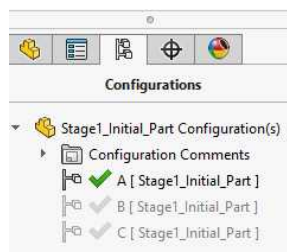
SEGMENT 2 WALKTHROUGH

CONFIGURATION

Question #2 Work Process

- Check the number of configurations

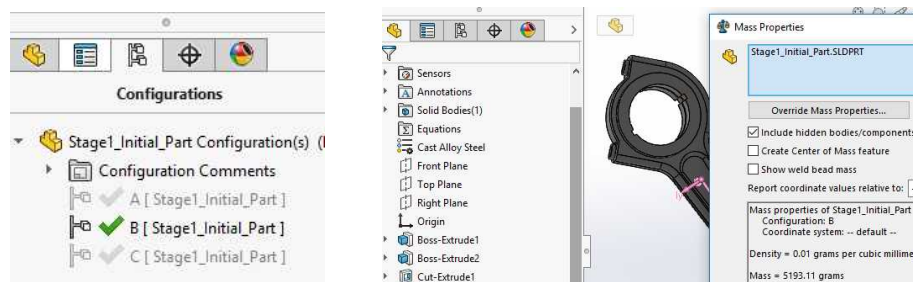
This question can be completed quickly within a couple of minutes. Just open the SOLIDWORKS part and save it. Then go to the **configuration manager**, then identify the number of configurations. In this case, there are **three configurations** shown in the configuration manager. Therefore, the answer is **3**. The first question in this segment is typically in a multiple-choice format. Check these three different configurations by double click on each configuration.



Question #3 Work Process

- Change the configuration and measure the mass

This one is also an easy problem. Change to **configuration B** and measure the mass. The answer should be **5193.11** grams. It is important to input the proper decimal places as described in the problem statement.

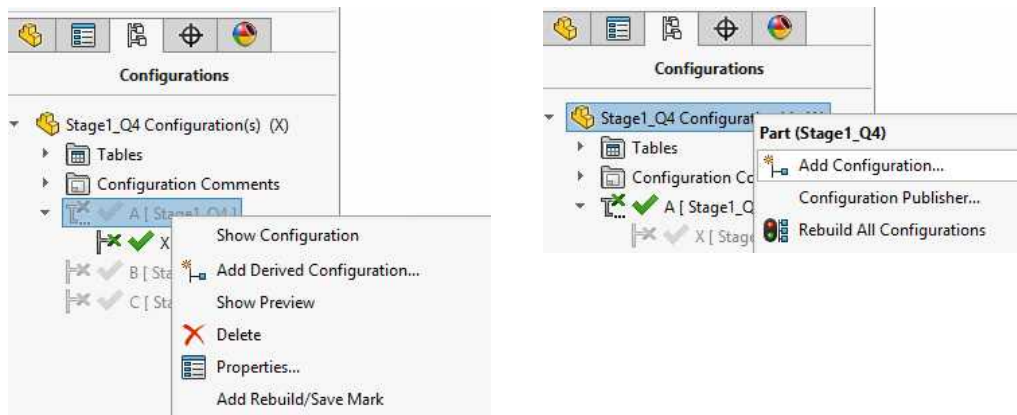


Question #4 Work Process

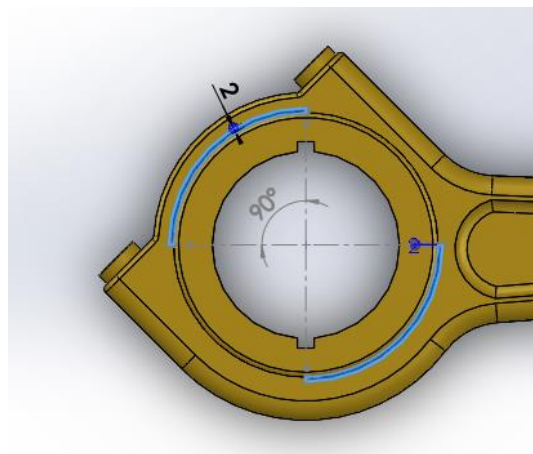
- **Create configuration and add a feature**

There are several ways to create a new configuration in the configuration manager. The most efficient way to create a configuration as shown below.

In the Configuration Manager, press RMB (Right Mouse Button) on **A configuration**, and select **Add Derived Configuration**. Or press RMB on a higher level to select **Add Configuration**. Either way is okay to solve the CSWP problem. A goal is to display different design intents and techniques.

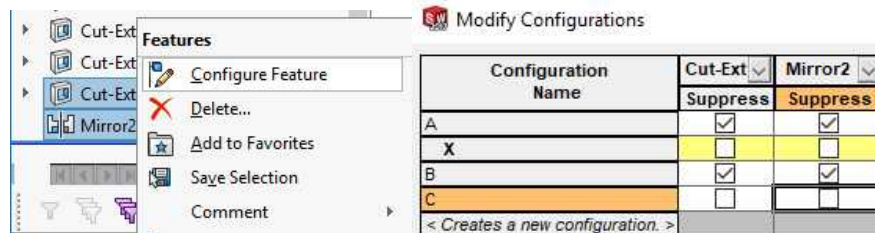


After creating the **X configuration**, sketch the slot profile based on the problem information. Then, Cut-extrusion to 2mm thickness which creates slots on both sides by mirroring.



After selecting the two created features, select the **Configure feature**. As described in the problem, these two features need to be suppressed in configurations other than X and C. Select Configuration X again and measure the mass.

The calculated mass should be **6154.97 grams** and finally save the part.



Question #5 Work Process

- **Change configuration and measure mass**

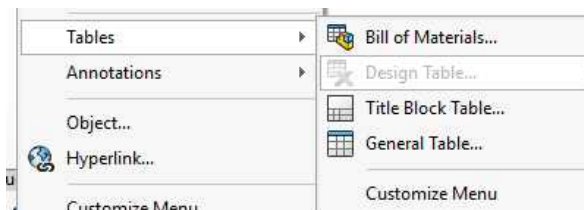
Just go back to configuration C and measure the mass. It gives **5453.07 grams**.

Question #6 Work Process

- **Create configuration using Design Table**

The last question on the configurations involves design tables. Since design tables are tools that are not commonly used by users, it is necessary to learn the basic functions used in CSWP. This question asks the users to create a design table.

Go back to configuration C. Create a design table by selecting **Insert→Tables→Design** table. SOLIDWORKS will find all the configurations present and automatically populate all dimensions that are different in any configurations into an Excel table. To make a new configuration in a design table, just copy the entire row and paste it at the end row. Create a new **configuration Y** from configuration C by copying and pasting a new row.



Then, change the following parameters in the design table for **configuration Y** to the following specified values. Enter each design value in corresponding cells in the Excel form of the design table. Go to Feature Manager design tree and change the material to Ti-5Al-2.5Sn Annealed. Then calculate the mass of the part of configuration Y which is around **3334.23 grams**. In the CSWP exam, you will need to enter this number exactly.

D3@Sketch1	315
D3@Sketch2	175
D3@Sketch4	62
D1@Sketch9	84

1	Design Table for: Stage1_Q6									
2		\$DESCRIPTION	\$COLOR	D1@Sketch1	D3@Sketch1	D3@Sketch2	D3@Sketch4	D5@Sketch2	\$LIBRARY:MATERIAL@Stage1_Q6	D1@Sketch9
3	A	A	2206419	78	322	180	60	135	SOLIDWORKS Materials:Brass	86
4	B	B	12370374	80	320	180	57	135	SOLIDWORKS Materials:Cast Alloy Steel	86
5	C	C	12370374	76	318	178	60	132	SOLIDWORKS Materials:Cast Alloy Steel	86
6	X	X	2206419						SOLIDWORKS Materials:Brass	
7	Y	Y	15594751	76	315	175	62	132	SOLIDWORKS Materials:Ti-5Al-2.5Sn Anne	84

* Note: some parameters need to be found manually (dimensions in equations)

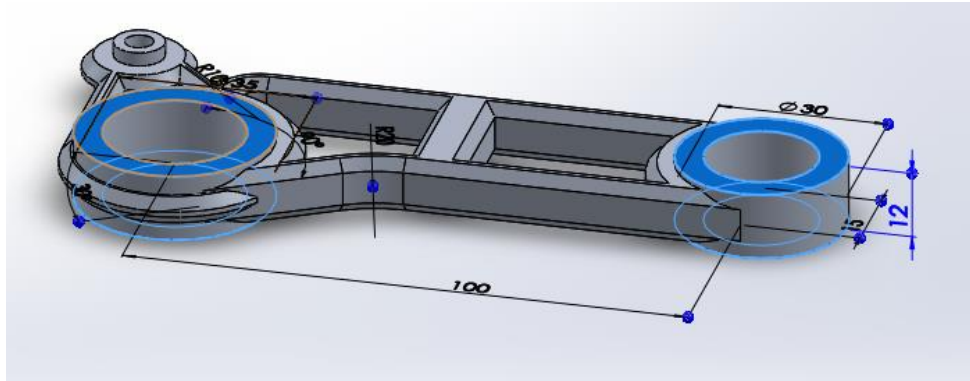
This is the first half of segment 2. Since there are no difficult questions in the configuration part, it is better to complete it within 10 minutes of the total 40 minutes.

The second half of segment 2 is to modify features and sketches of an existing part and recover from rebuild errors while maintaining the overall design intent.

Question #8 Work Process

▪ Change height

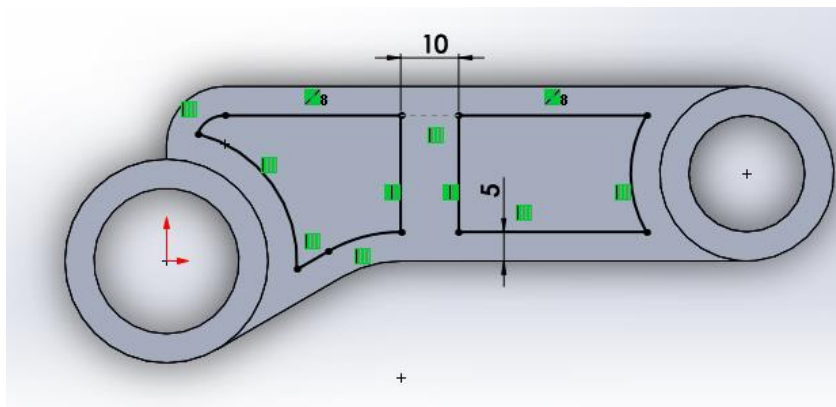
Open the existing part and modify the value of thickness from 15mm to **12mm**. Then, calculate the mass of the resulting part in grams. The answer would be **66.86 grams**.



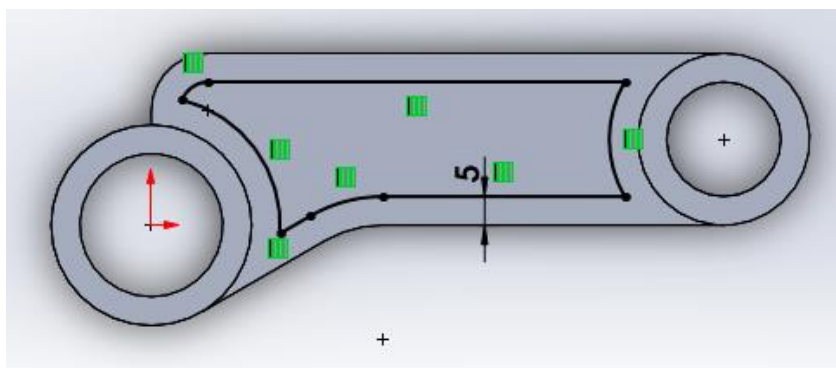
Question #9 Work Process

- **Modify the sketch**

This problem intends to evaluate how appropriately the sketch profile can be modified. The goal of the problem is how to properly remove the center component that connects the two cylinders (like a connecting beam). Maintain the other dimensions in the existing part. After modification, don't forget to run **Rebuild** command. Then, calculate the mass of the part in grams. The answer is **61.74 grams**



Existing part

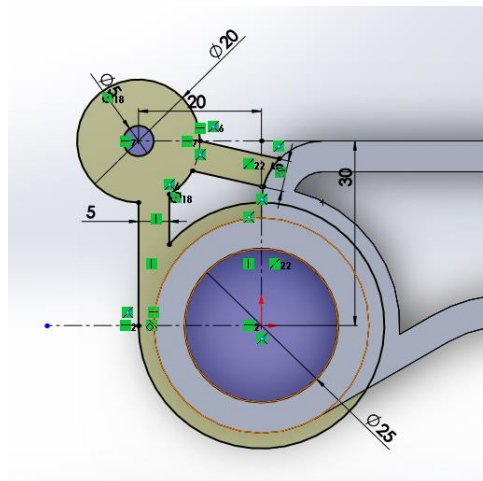
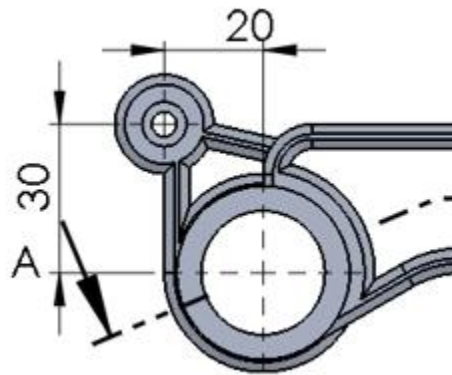


Modified part

Question #10 Work Process

Intermediate modification

This question intends to modify some sketches and features. Also, evaluate how to resolve the rebuilding of errors after modification. Some sketches contain dimensions or relations to model geometry which needs to be modified. After modifying the location of the mounting hole according to the drawing, if an error or warning occurs in the process of rebuilding, check the figure below to see if there is any correction in the geometric relation. The answer is **59.97** grams.

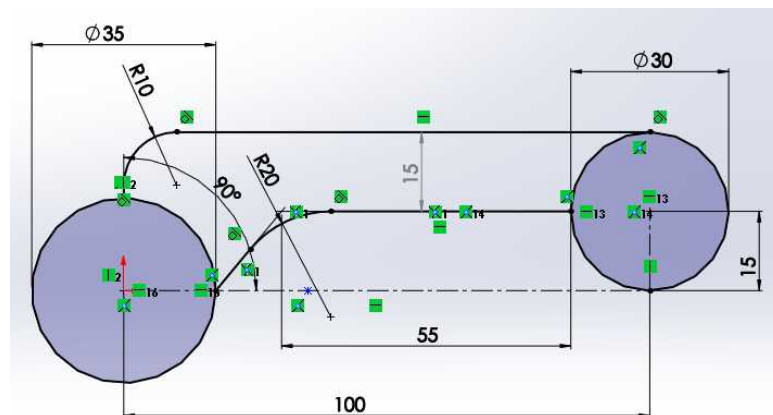


Question #11 Work Process

- **Intermediate modification**

This problem is more about complex modifications. Existing sketches have geometric relations as well as dimensions. If you change only the values of the dimensions provided by the drawing and rebuild, there may be some warnings or errors. Of course, if you understand the drawing correctly and modify the item correctly to match the design intent, no errors will occur. If you get an unexpected error or warning during the CSWP exam, you will probably run out of time while trying to fix it. At this preparation stage, training to capture design intent by a quick review of drawings is much needed to pass the exam within 40 minutes.

The most demanding task of this question is to modify the profiles of connecting components. If you encounter any errors during a rebuild, refer to below dimensions and geometric relation to fix your problems. The answer is 61.49 grams.

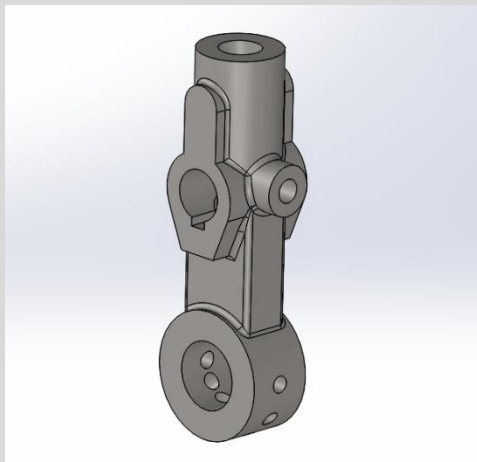


Now, you have completed the Segment 2 section. The problems in this segment are not too difficult and not time-consuming but you only have 40 minutes to find the answers. The most time-consuming part is the modifying problems based on the drawings in the later second half. The design intent must be accurately identified and modified to avoid complicated warnings and errors during the rebuilding process. The CSWP exam tends to generate warnings if test takers simply modify the dimensions of a sketch without consideration of design intent, so careful review of the 2D and isometric views to understand the exact geometry and the intentions of the designer helps to complete the model within a given time. A total score of 115 or higher out of 155 is required to pass the second segment.

3.4 Practice Exam Set 2

Exam Set 2 [Segment 2]

Certified SolidWorks Professional CSWP Segment 2 Test



- Segment 2 Assemblies
 - Analyzing configuration
 - Modifying configuration
 - Understanding design intent
 - Modifying geometry
 - Creating feature
- Test duration: 40 min
- Total points: 155 points
- Total Questions: 11
- Pass score: 115

[Start Examination>](#)

Question 1 of 11

EXAM SET 2

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 11 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 40 minutes to complete this examination
- Minimum passing score is 115 out of 155

Press **Start** Examination button to continue.

[Start](#)**Question 1.****Part configuration problem set description**

This text describes the problem that must be solved in this problem set.

You will be downloading an existing part and modifying its geometry based on the use of configurations.

You will be asked to do the following:

- Analyze existing configuration correctly.
- Modify geometry
- Modify existing configurations
- Create new configurations

Please select continue to the next question.

.

[Continue](#)

Question 2 of 11

EXAM SET 2

For 10 points

Existing configurations

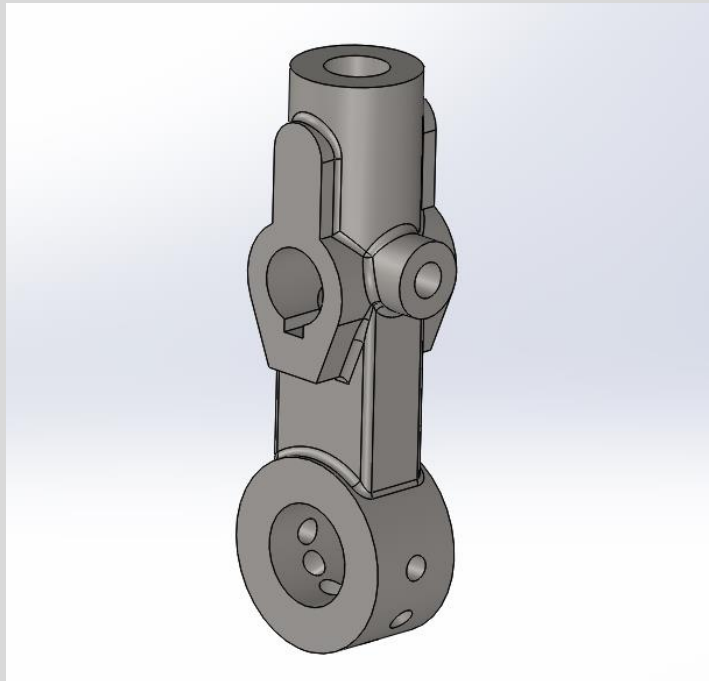
Unit system: MMGS (mm, gram, sec)

Decimal places: 2

-Open existing part model.

-Determine how many existing configurations there are in the part.

How many existing configurations are there in the downloaded part?

☐ 4 ☐ 6 ☐ 5 ☐ 7[>> Download file: Stages_initial part.sldprt](#)

Next Question >

Question 3 of 11

EXAM SET 2

For 10 points

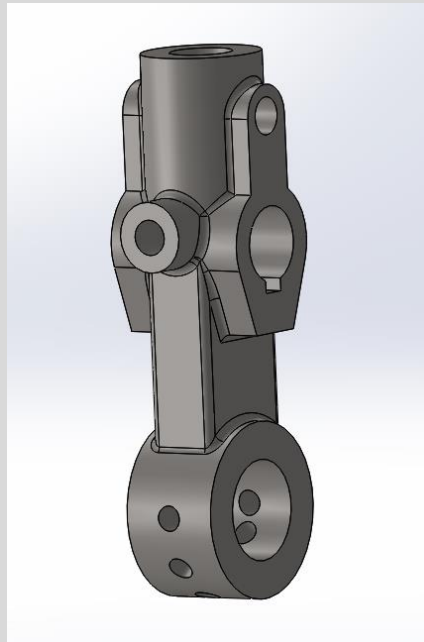
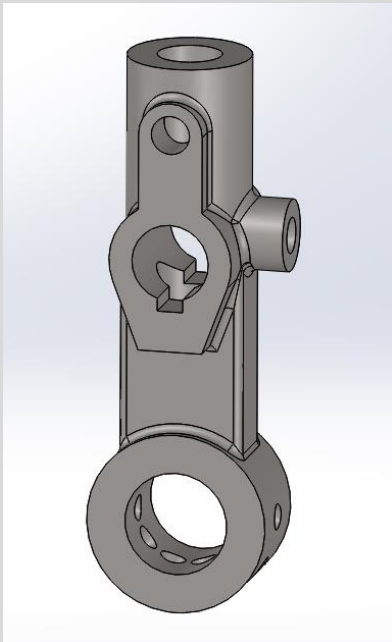
Configuration C

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

- Switch to configuration **C**
- Measure the mass of the part

What is the mass of the resultant part (grams)?

Enter Value: []

Next Question >

Question 4 of 11

EXAM SET 2

For 15 points

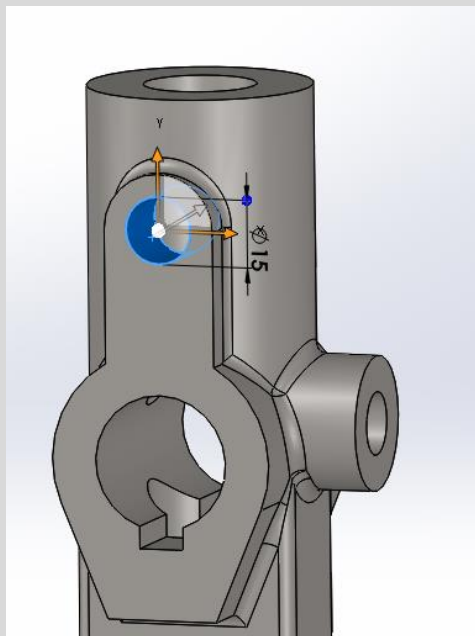
Create Configuration Z

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

- Create new configuration named **Z** based on configuration **A**.
- Create a through hole as indicated in the image that will be suppressed in all other configurations except for **Z** and **B**. (In other words, in configuration Z and B this new feature will be unsuppressed)
- *Note: This hole is concentric to the boss on where it is created
- Remaining in configuration Z, measure the mass of the part.

What is the mass of the part (grams)?

Enter Value: []

Next Question >

Question 5 of 11

EXAM SET 2

For 15 points

Configuration B

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

-Switch back to configuration B.

-Measure the mass of the part

What is the mass of the part (grams)?

Enter Value: []

Next Question >

Question 6 of 11

EXAM SET 2

For 15 points

Design Table

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: Copper

Density: 8900kg/m³

- Remain in configuration 'B'
- Create a design table using the 'Auto-create' option
- Create a new configuration 'E' by copying the row of configuration 'B' in the design table and pasting a new row.
- Change the following parameters in the design table for configuration 'E' to the following specified values:

D2@Sketch6	27
Dia_in@Sketch2	42
D1@Sketch11	17
D2@Sketch9	9
D4@Sketch6	34

*Note: some parameters need to be found manually (dimensions in equation option)

- Switch to configuration 'E'
- Set material of configuration 'E' to be **Copper**.
- Measure the mass of the part.

What is the mass of the part (grams)?

Enter Value: []

Next Question >

Question 7 of 11

EXAM SET 2

For 0 points

Modify existing part problem set

Description

This text describes the problem that must be solved in this problem set.

You will be downloading an existing part and modifying its geometry through modification of its existing features and parameters.

You will be asked to do the following:

- Modify feature parameters
- Modify sketch planes

Please select continue to the next question.

[Continue](#)

Question 8 of 11

EXAM SET 2

For 20 points

Change dimensions

Change the height of the cylindrical end of the handle.

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

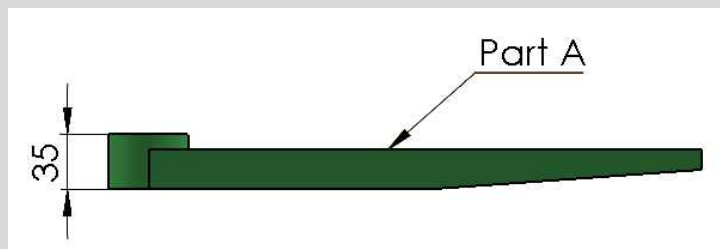
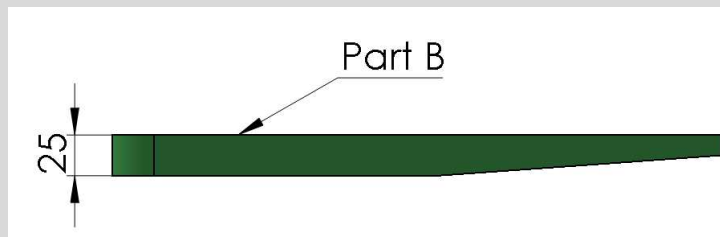
- Open the attached part.
- Modify the starting part by changing the height of the cylindrical end from 35mm to 25mm. The resultant part is labelled as **Part B** in the images.

*Note: The part before the modification is labelled **Part A** and the part after the modification is labelled **Part B**. (See images). No other parameters or feature dimensions will change.

- Measure the mass of the resultant part

What is the mass of the resultant part (grams)?

Enter Value: []

**Part A****Part B**[Next Question >](#)

Question 9 of 11

EXAM SET 2

For 20 points

Change dimensions

Change the wall thickness of the main handle area

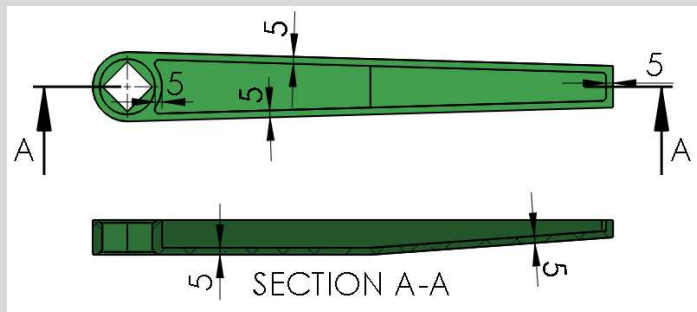
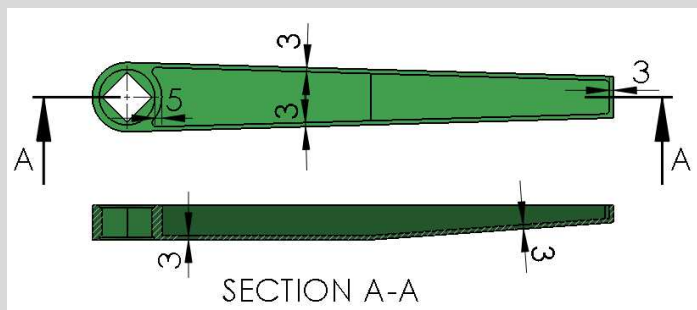
Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

- Modify the wall thickness of the handle area of the Part A from 5mm to 3mm
- No other parameters or feature dimensions will change.
- Measure the mass of the resultant part.

What's the mass of the resultant part? (grams)

Enter Value: []**Part A****Part B**[Next Question >](#)

Question 10 of 11

EXAM SET 2

For 25 points

Intermediate Modifications

Change the profile of cylindrical portion of the part

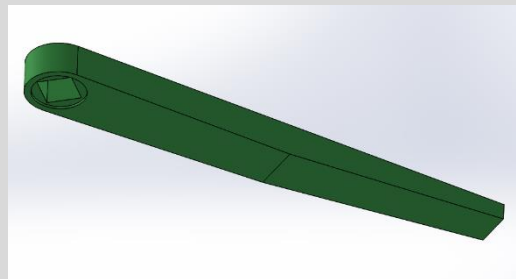
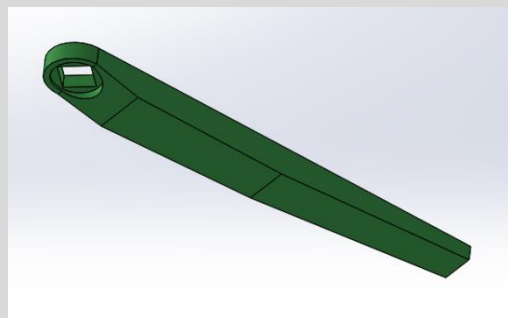
Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

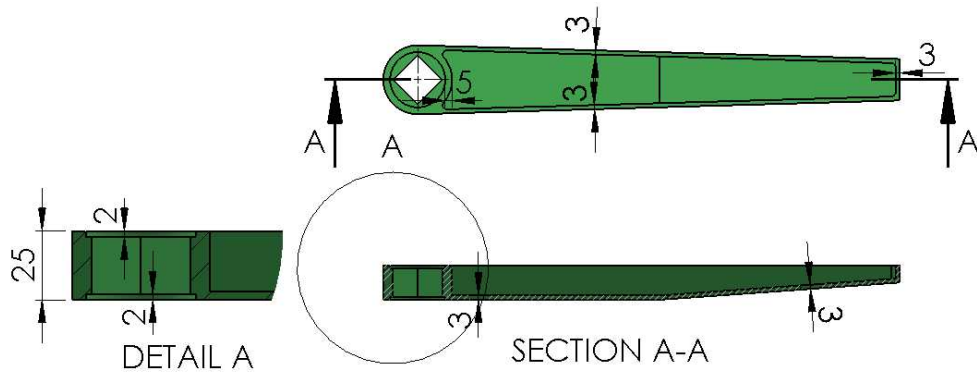
- Modify the wall thickness of the handle area of the Part A from 3mm to 5.5mm
 - Modify the area where the handle meets the cylindrical portion of the part (See images)
 - Modify the height of the cylindrical portion of the part
 - No other parameters or feature dimensions will change
- *HINT #1: In detail view, the dimension of 40mm is measured from the tangent point of where the straight part of the handle meets the cylindrical portion
- Measure the mass of the resultant part.

What's the mass of the resultant part? (grams)

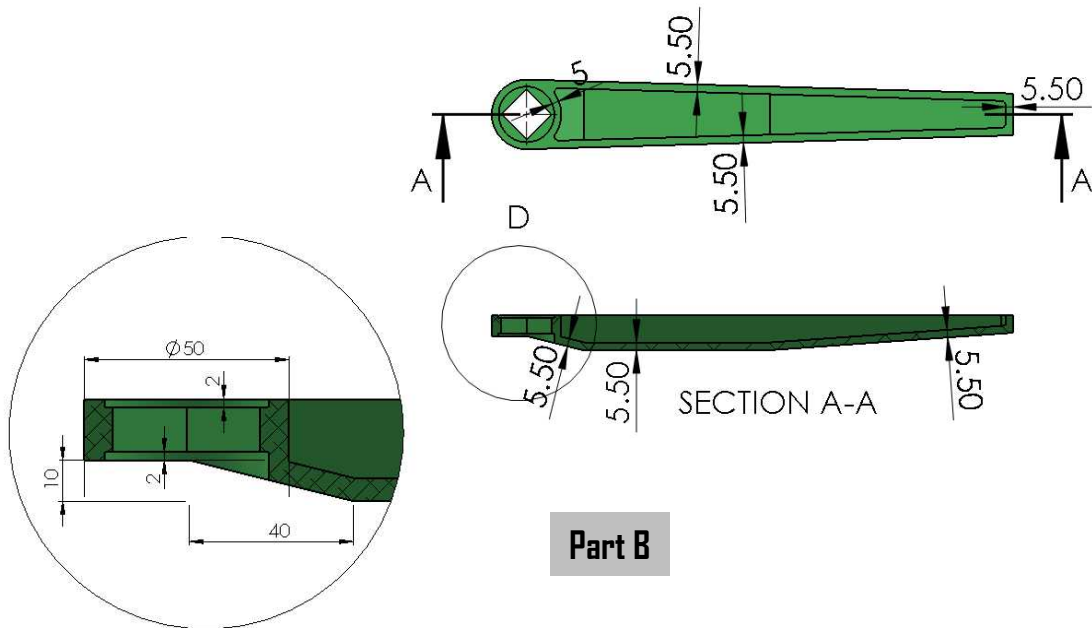
Enter Value: []**Part A****Part B**

Next Question >

Reference Image for Q10 of Exam Set 2 >>



Part A



Part B

Question 11 of 11

EXAM SET 2

For 25 points

Final modifications

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

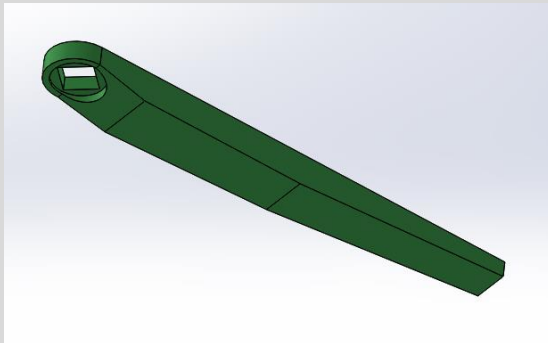
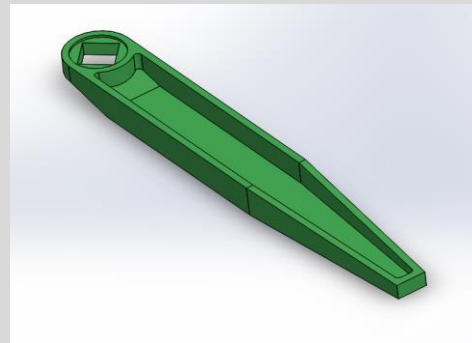
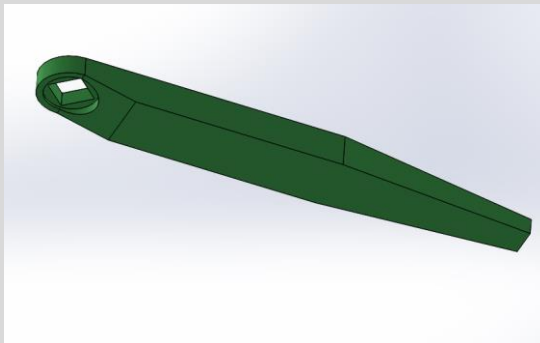
-Modify the handle as shown in the images.

-No other parameters or feature will change.

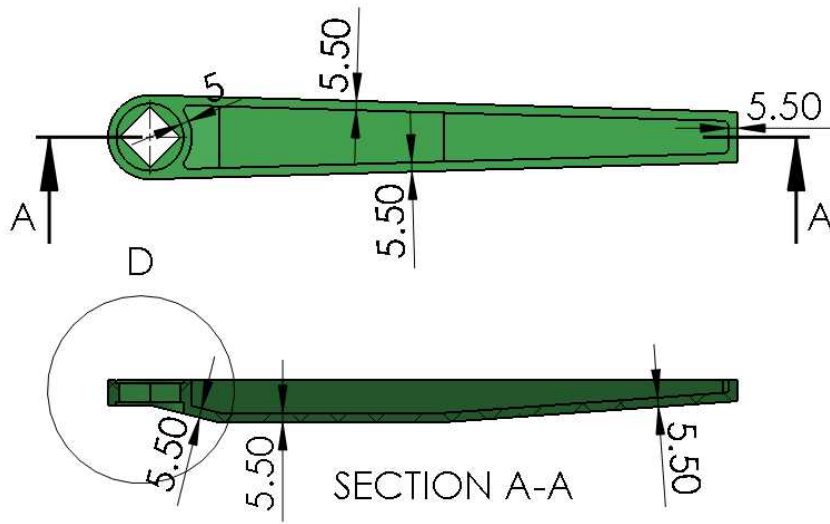
*Note: The part before the modification is labeled Part A and the part after modification is labeled Part B.

-Measure the mass of the resultant part.

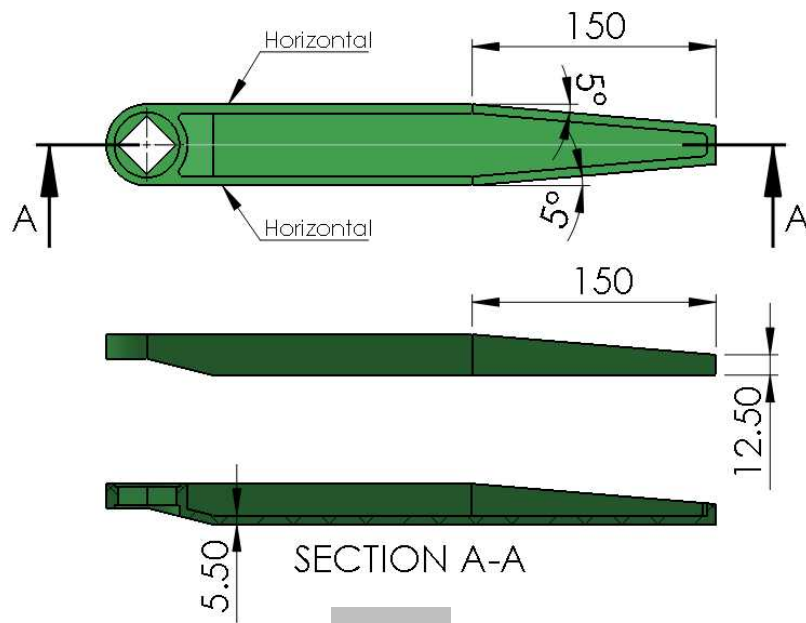
What's the mass of the resultant part? (grams)

Enter Value: []**Part A****Part B**[Next Question >](#)

Reference Image for Q11 of Exam Set 2 >>



Part A



Part B

Answer Sheet

EXAM SET 2

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Check configuration number	10	☐ 4
3	Change configuration	10	2678.43
4	Create configuration X	15	2498.55
5	Change configuration	15	2146.56
6	Design table	15	2568.21
7	Information	0	-
8	Change dimensions	20	415.13
9	Modify features	20	295.31
10	Intermediate modifications	25	407.20
11	Final modifications	25	434.39
	Total	155	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here, while **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

- What's your score?
- Do you finish segment 2 test within 40 minutes? ☐ Yes ☐ No
- Do you pass segment 2 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating configuration
 - ☐ Understanding design intent
 - ☐ Using design table
 - ☐ Modifying feature
 - ☐ Repairing warning and error
 - ☐ Creating feature

E N D o f E X A M S E T N o . 2

3.5 Practice Exam Set 3

Exam Set 3 [Segment 2]

Certified SolidWorks Professional CSWP Segment 2 Test



- Segment 2 Assemblies
 - Analyzing configuration
 - Modifying configuration
 - Understanding design intent
 - Modifying geometry
 - Creating feature
- Test duration: 40 min
- Total points: 155 points
- Total Questions: 11
- Pass score: 115

[Start Examination>](#)

Question 1 of 11

EXAM SET 3

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 11 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 40 minutes to complete this examination
- Minimum passing score is 115 out of 155

Press **Start** Examination button to continue.

[Start](#)**Question 1.****Part configuration problem set description**

This text describes the problem that must be solved in this problem set.

You will be downloading an existing part and modifying its geometry based on the use of configurations.

You will be asked to do the following:

- Analyze existing configuration correctly.
- Modify geometry
- Modify existing configurations
- Create new configurations

Please select continue to the next question.

[Continue](#)

Question 2 of 11

EXAM SET 3

For 10 points

Existing configurations

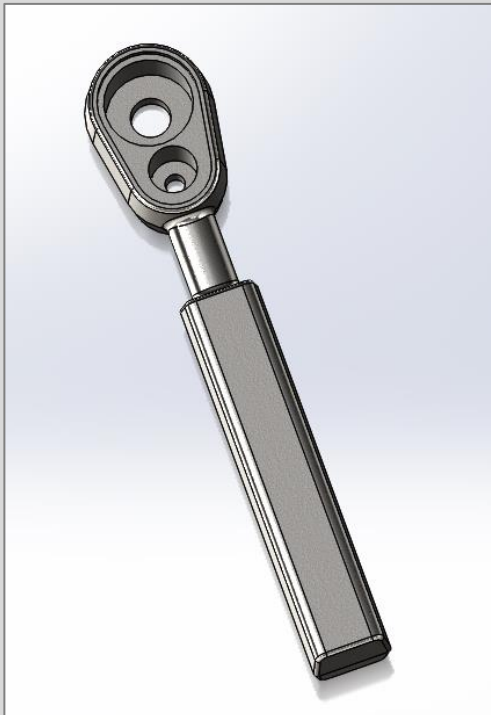
Unit system: MMGS (mm, gram, sec)

Decimal places: 2

-Open existing part model.

-Determine how many existing configurations there are in the part.

How many existing configurations are there in the downloaded part?

☐ 4 ☐ 6 ☐ 5 ☐ 7[>> Download file: Stager_initial part.sldprt](#)

Next Question >

Question 3 of 11

EXAM SET 3

For 10 points

Configuration B

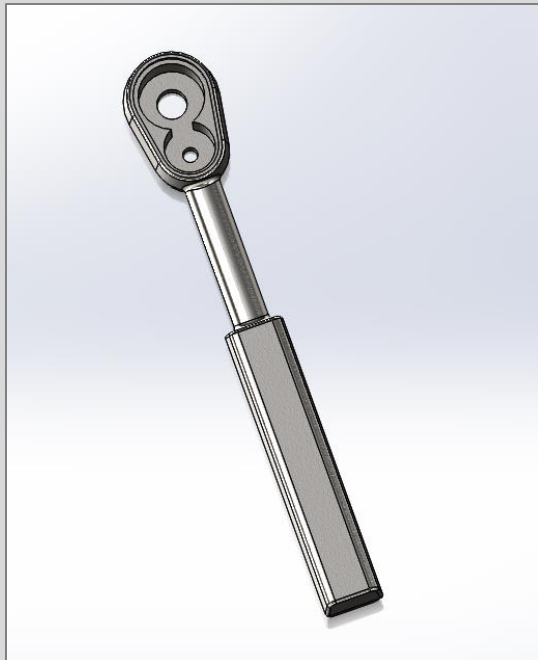
Unit system: MMGS (mm, gram, sec)

Decimal places: 2

-Switch to configuration **B**

-Measure the mass of the part

What is the mass of the resultant part (grams)?

Enter Value: []

Next Question >

Question 4 of 11

EXAM SET 3

For 10 points

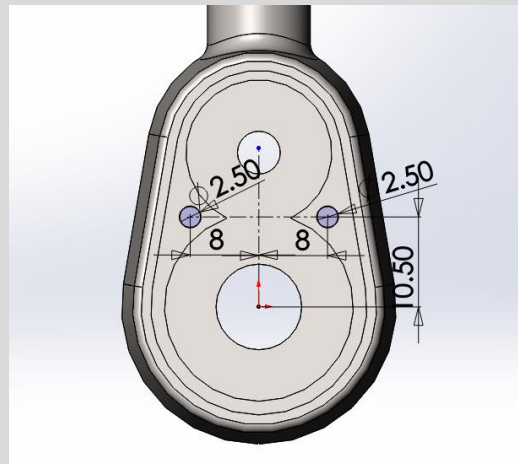
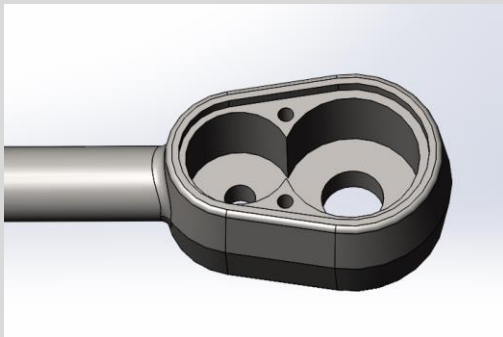
Create Configuration X

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

- Create new configuration named **X** based on configuration **B**.
- Create two through holes as indicated in the image that will be suppressed in all other configurations except for **X** and **C**. (In other words, in configuration X and C this new feature will be unsuppressed)
- *Note: Hole sizes are identical.
- Remaining in configuration X, measure the mass of the part.

What is the mass of the part (grams)?

Enter Value: 

Next Question >

Question 5 of 11

EXAM SET 3

For 10 points

Configuration C

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

-Switch back to configuration **C**.

-Measure the mass of the part

What is the mass of the part (grams)?

Enter Value: []

Next Question >

Question 6 of 11

EXAM SET 3

For 10 points

Design Table

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: Nickel

Density: 8500kg/m³

- Remain in configuration 'C'
- Create a design table using the 'Auto-create' option
- Create a new configuration 'F' by copying the row of configuration 'C' in the design table and pasting a new row.
- Change the following parameters in the design table for configuration 'F' to the following specified values:

D1@Sketch1	160
D2@Sketch6	5
D1@Sketch7	6
D1@Sketch8	13

- Switch to configuration 'F'
- Set material of configuration 'F' to be **Nickel**.
- Measure the mass of the part.

What is the mass of the part (grams)?

Enter Value: []

Next Question >

Question 7 of 11

EXAM SET 3

For 0 points

Modify existing part problem set

Description

This text describes the problem that must be solved in this problem set.

You will be downloading an existing part and modifying its geometry through modification of its existing features and parameters.

You will be asked to do the following:

- Modify feature parameters
- Modify sketch planes

Please select continue to the next question.

[Continue](#)

Question 8 of 11

EXAM SET 3

For 10 points

Change dimensions

Change the radius of inner space of the bicycle pedal

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

-Open the attached part.

-Modify the starting part by changing the radius of both inner spaces in bicycle pedal from **55mm** to **65mm**. The resultant part is labelled as **Part B** in the images.

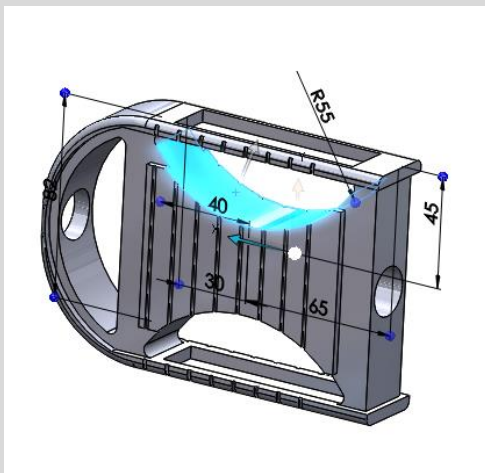
* Hint: center of radius will not change

-No other parameters or feature dimensions will change.

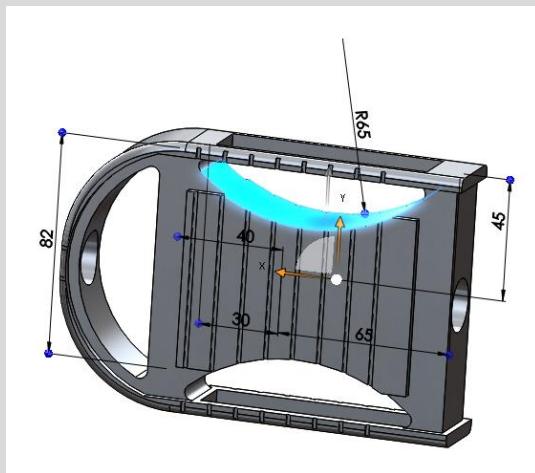
-Measure the mass of the resultant part

What is the mass of the resultant part (grams)?

Enter Value: []



Part A



Part B

[Next Question >](#)

Question 9 of 11

EXAM SET 3

For 20 points

Change dimensions

Change the thickness of the pedal

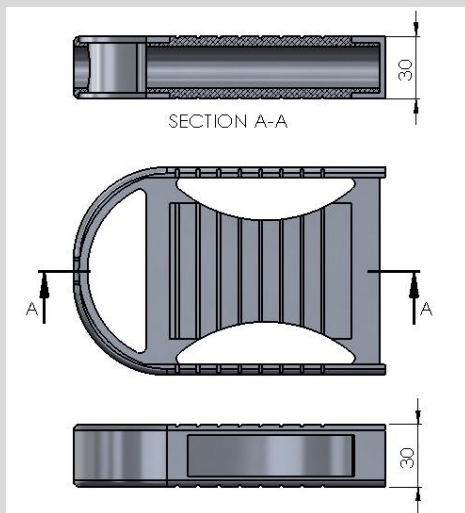
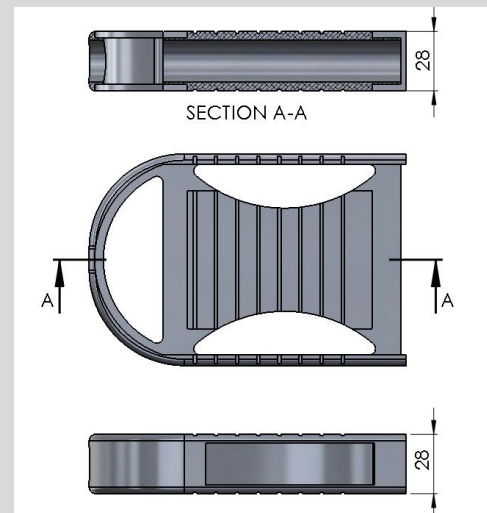
Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

- Modify the thickness of the pedal of the Part A from 30mm to 28mm
- No other parameters or feature dimensions will change.
- Measure the mass of the resultant part.

What's the mass of the resultant part? (grams)

Enter Value: []**Part A****Part B**

Next Question >

Question 10 of 11

EXAM SET 3

For 25 points

Intermediate Modifications

Modify the groove profiles on both top and bottom pads of the pedal

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

-Modify the groove profiles on top and bottom pads of the pedal as indicated in images.

* Note: No. of groove changed from **8** (Part A) to **7** (Part B).

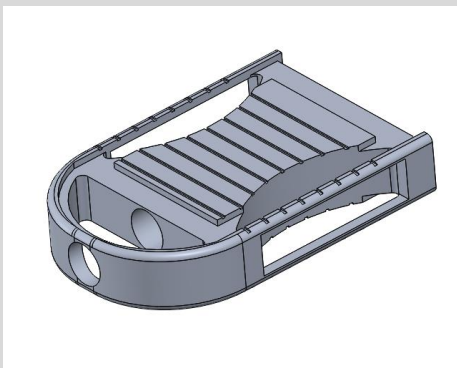
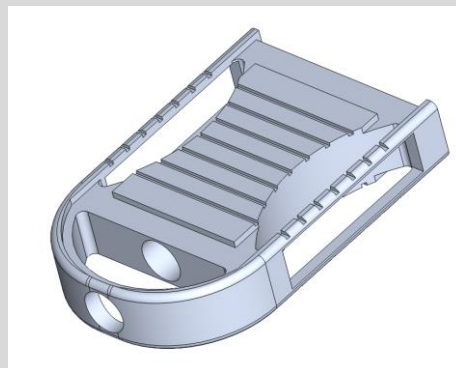
-No other parameters or feature dimensions will change

*HINT #1: The groove patterns are symmetrical for both top and bottom pads. The part before the modification is labeled **Part A** and the part after modification is labeled **Part B**.

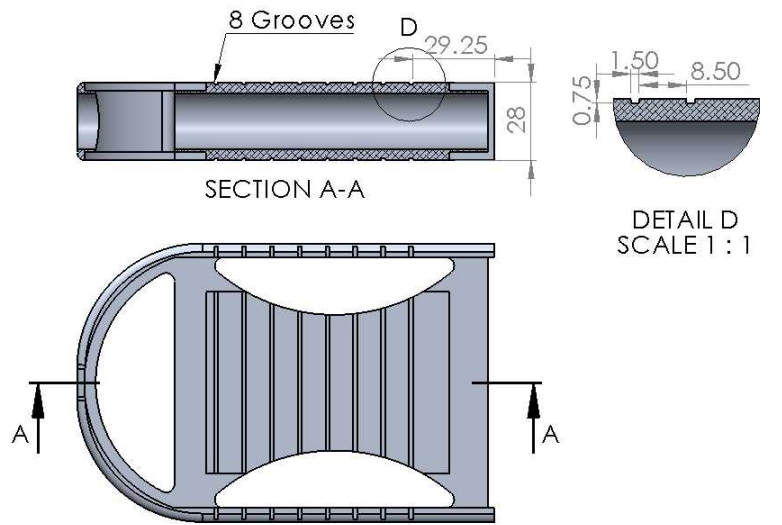
-Measure the mass of the resultant part.

What's the mass of the resultant part? (grams)

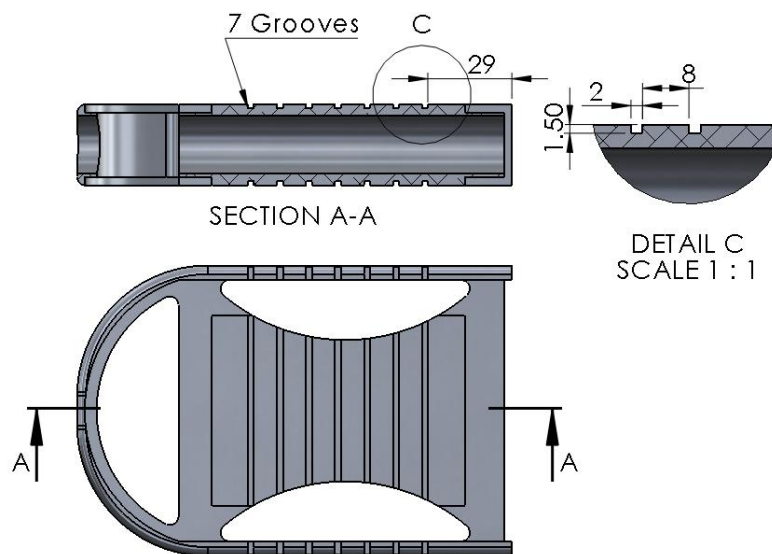
Enter Value: []

**Part A****Part B**[Next Question >](#)

Reference Image for Q10 of Exam Set 3 >>



Part A



Part B

Question 11 of 11

EXAM SET 3

For 20 points

Final modifications

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

-Modify the inner opening shape as described in the images.

-No other parameters or feature will change.

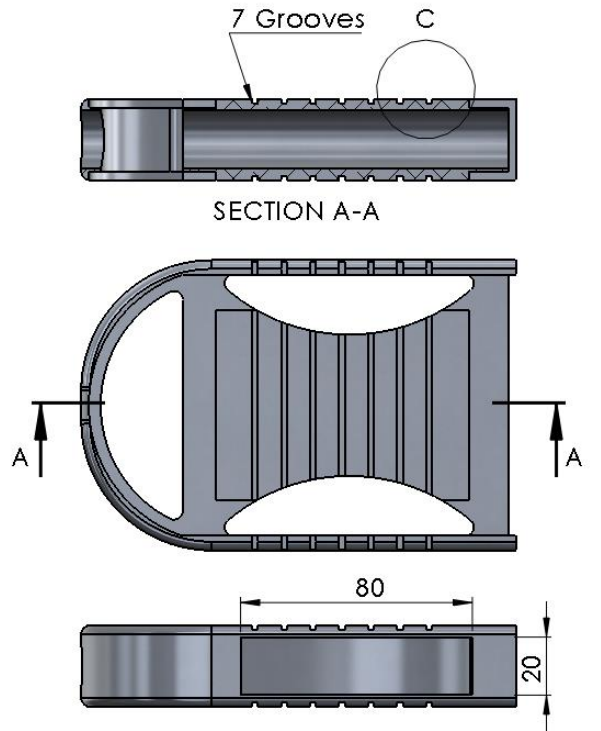
*Note: The part before the modification is labeled Part A and the part after modification is labeled Part B.

-Measure the mass of the resultant part.

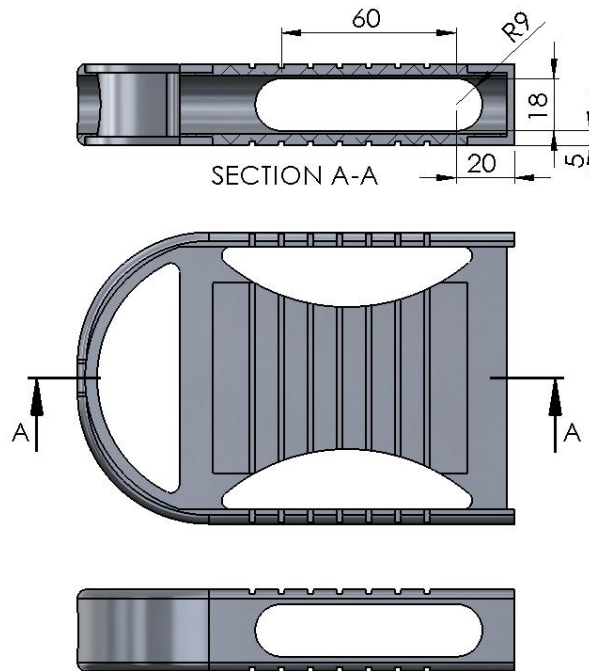
What's the mass of the resultant part? (grams)

Enter Value: []**Part A****Part B**[Next Question >](#)

Reference Image for Q11 of Exam Set 3 >>



Part A



Part B

Answer Sheet

EXAM SET 3

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Check configuration number	10	☐ 5
3	Change configuration	10	394.84
4	Create configuration X	15	393.55
5	Change configuration	15	403.64
6	Design table	15	446.77
7	Information	0	-
8	Change dimensions	20	576.26
9	Modify features	20	524.58
10	Intermediate modifications	25	520.52
11	Final modifications	25	381.61
	Total	155	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

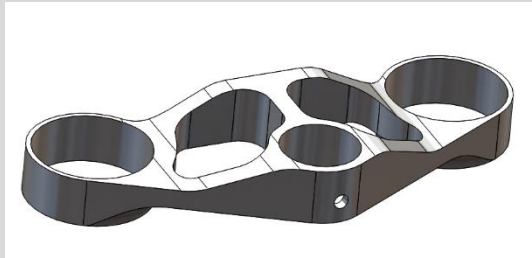
- What's your score?
- Do you finish segment 2 test within 40 minutes? ☐ Yes ☐ No
- Do you pass segment 2 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating configuration
 - ☐ Understanding design intent
 - ☐ Using design table
 - ☐ Modifying feature
 - ☐ Repairing warning and error
 - ☐ Creating feature

E N D o f E X A M S E T N o . 3

3.6 Practice Exam Set 4

Exam Set 4 [Segment 2]

Certified SolidWorks Professional CSWP Segment 2 Test



- Segment 2 Assemblies
 - Analyzing configuration
 - Modifying configuration
 - Understanding design intent
 - Modifying geometry
 - Creating feature
- Test duration: 40 min
- Total points: 155 points
- Total Questions: 11
- Pass score: 115

[Start Examination>](#)

Question 1 of 11

EXAM SET 4

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 11 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 40 minutes to complete this examination
- Minimum passing score is 115 out of 155

Press **Start** Examination button to continue.

[Start](#)**Question 1.****Part configuration problem set description**

This text describes the problem that must be solved in this problem set.

You will be downloading an existing part and modifying its geometry based on the use of configurations.

You will be asked to do the following:

- Analyze existing configuration correctly.
- Modify geometry
- Modify existing configurations
- Create new configurations

Please select continue to the next question.

.

[Continue](#)

Question 2 of 11

EXAM SET 4

For 10 points

Existing configurations

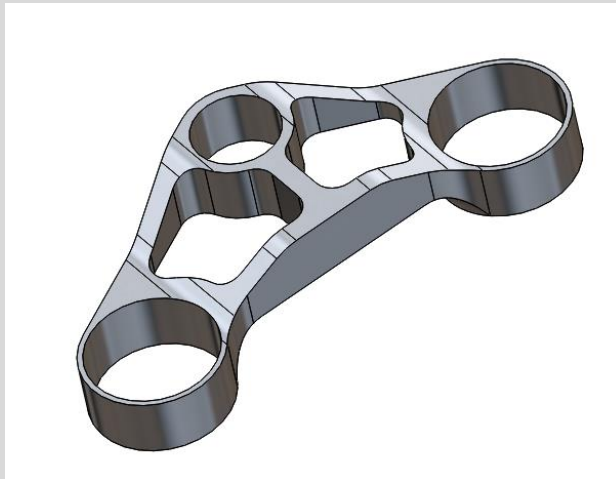
Unit system: MMGS (mm, gram, sec)

Decimal places: 2

-Open existing part model.

-Determine how many existing configurations there are in the part.

How many existing configurations are there in the downloaded part?

☐ 4 ☐ 6 ☐ 5 ☐ 3[>> Download file: Stagel_initial part.sldprt](#)

Next Question >

Question 3 of 11

EXAM SET 4

For 10 points

Configuration B

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

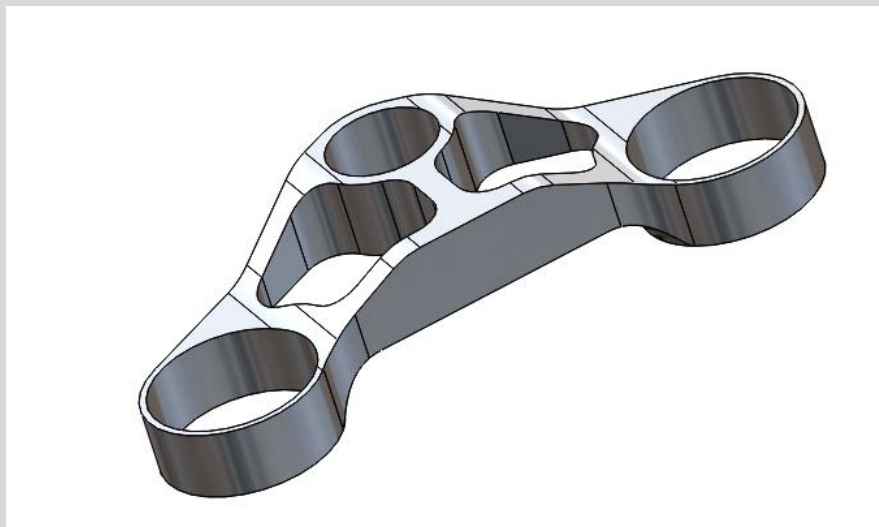
Material: 2024-T6

Density: 2800kg/m³

-Switch to configuration B

-Measure the mass of the part

What is the mass of the resultant part (grams)?

Enter Value: []

Configuration B

Next Question >

Question 4 of 11

EXAM SET 4

For 10 points

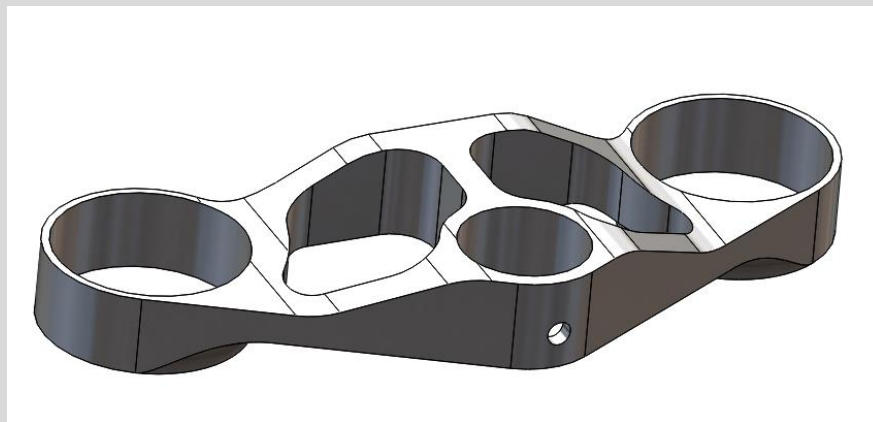
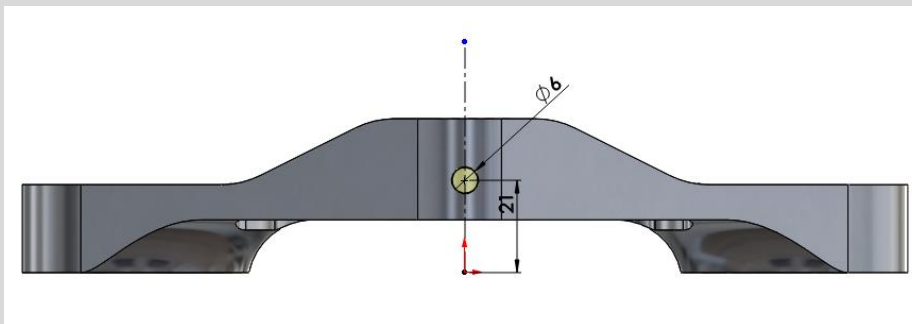
Create Configuration X

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

- Create new configuration named **X** based on configuration **B**.
- Create a hole as indicated in the image that will be suppressed in all other configurations except for **X** and **C**. (In other words, in configuration **X** and **C** this new feature will be unsuppressed)
- *Note: Hole is **no**-through hole. (see image)
- Remaining in configuration **X**, measure the mass of the part.

What is the mass of the part (grams)?

Enter Value: []

Configuration X

Next Question >

Question 5 of 11

EXAM SET 4

For 10 points

Configuration C

Unit system: MMGS (mm, gram, sec)

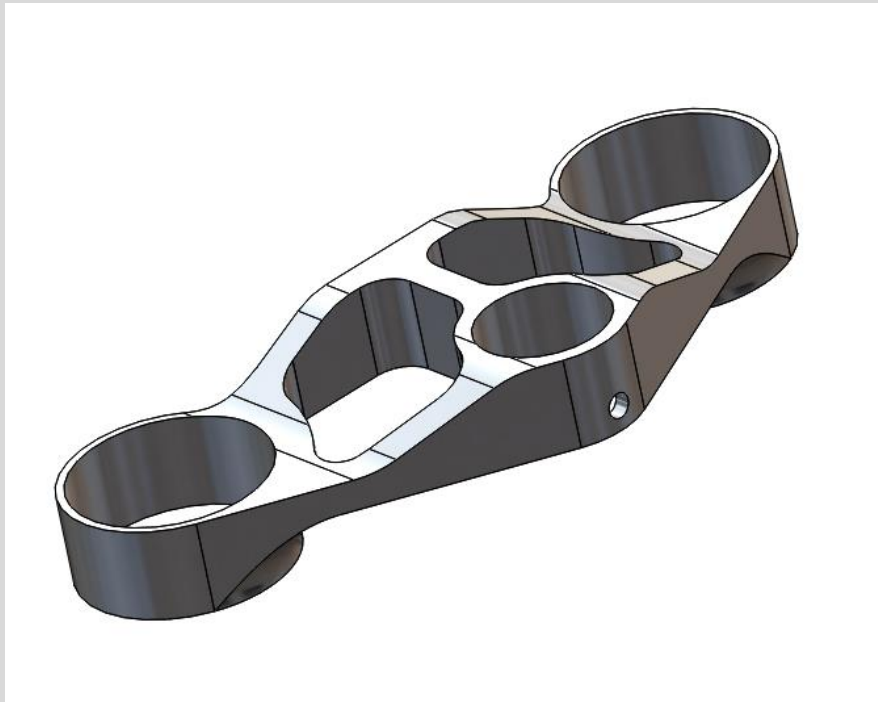
Decimal places: 2

Material: 2024-T6

Density: 2800kg/m³-Switch back to configuration **C**.

-Measure the mass of the part

What is the mass of the part (grams)?

Enter Value: []Configuration **C**

Next Question >

Question 6 of 11

EXAM SET 4

For 10 points

Design Table

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Alloy Aluminum

Density: 2700kg/m³

- Remain in configuration 'C'
- Create a design table using the 'Auto-create' option
- Create a new configuration 'F' by copying the row of configuration 'C' in the design table and pasting a new row.
- Change the following parameters in the design table for configuration 'F' to the following specified values:

D1@Sketch1	43
D2@Sketch1	150
D1@Boss-Extrude1	38
D1@Cut-Extrude2	16
D1@Fillet3	11

- Switch to configuration 'F'
- Set material of configuration 'F' to be **1060 Alloy Aluminum**.
- Measure the mass of the part.

What is the mass of the part (grams)?

Enter Value: []

Next Question >

Question 7 of 11

EXAM SET 4

For 0 points

Modify existing part problem set

Description

This text describes the problem that must be solved in this problem set.

You will be downloading an existing part and modifying its geometry through modification of its existing features and parameters.

You will be asked to do the following:

- Modify feature parameters
- Modify sketch planes

Please select continue to the next question.

>> Download file: Stage2_initial part.sldprt



Excavator Boom Structure

Continue

Question 8 of 11

EXAM SET 4

For 20 points

Change dimensions

Change the thickness of Boom structure of the excavator

Unit system: MKS (m, kg, sec)

Decimal places: 2

Material: Cast Alloy Steel

-Open the attached part.

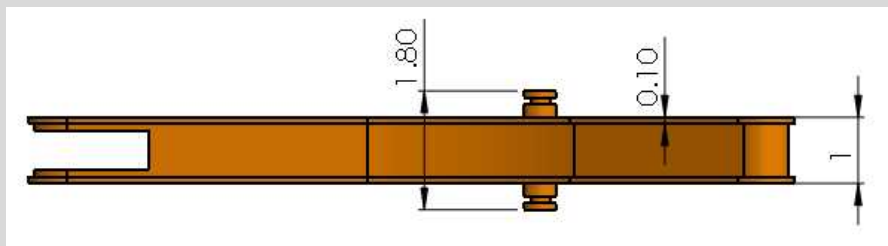
-Modify the starting part by changing the thickness of boom from 1m to **1.2m**. The resultant part is labelled as **Part B** in the images.

-No other parameters or feature dimensions will change unless further indication in drawing.

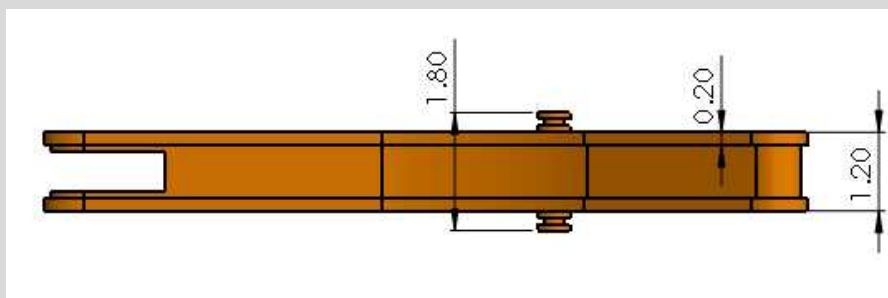
-Measure the mass of the resultant part

What is the mass of the resultant part (kg)?

Enter Value: []



Part A



Part B

Next Question >

Question 9 of 11

EXAM SET 4

For 20 points

Modify a feature

Change the angle of boom structure

Unit system: MKS (m, kg, sec)

Decimal places: 2

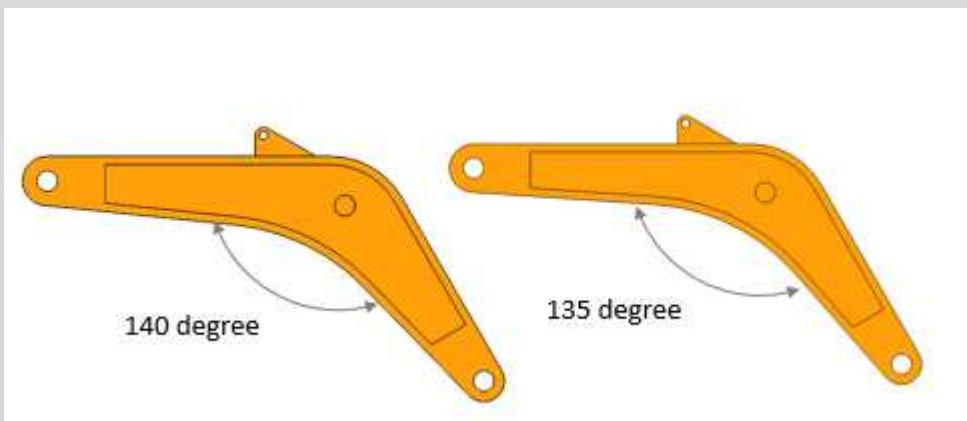
Material: Cast Alloy Steel

-Modify the angle between lower surfaces of the boom from 140 degree to **135 degree** (see image)

-No other parameters or feature dimensions will change.

-Measure the mass of the resultant part.

What's the mass of the resultant part? (kg)

Enter Value: []

Part A

Part B

Next Question >

Question 10 of 11

EXAM SET 4

For 25 points

Intermediate Modifications

Change the shape of arm pin lug and side surfaces

Unit system: MKS (m, kg, sec)

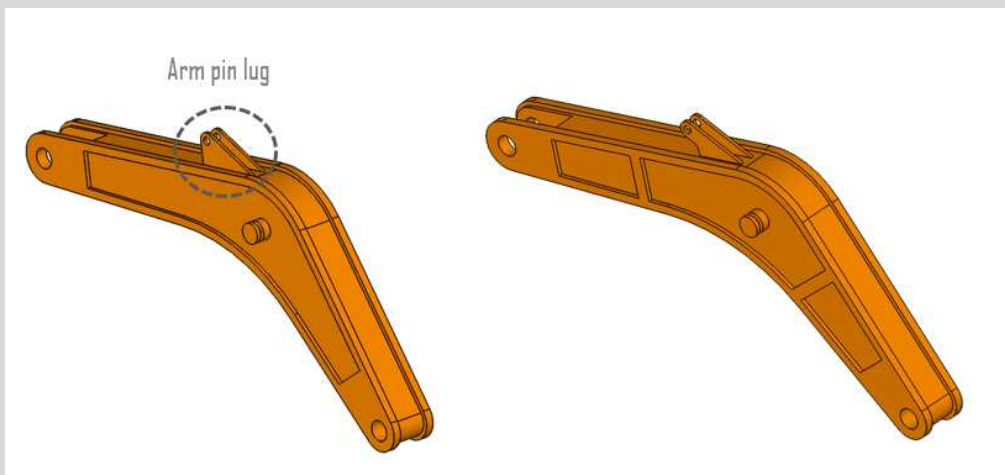
Decimal places: 2

Material: Cast Alloy Steel

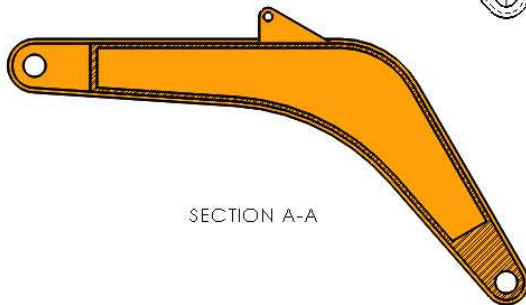
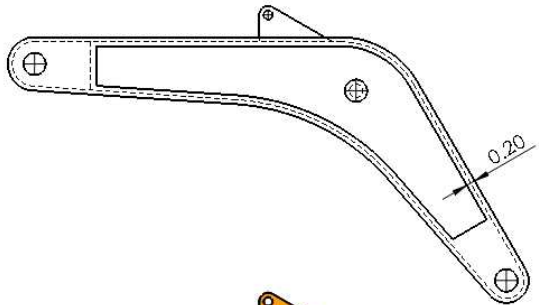
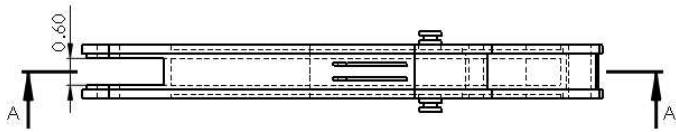
- Modify the shape of arm pin lug of boom in the Part A.
- Modify the side surface profile of the part (See images)
- No other parameters or feature dimensions will change
- *HINT #1: Both profiles of side surfaces are symmetrical
- Measure the mass of the resultant part.

What's the mass of the resultant part? (kg)

Enter Value: []

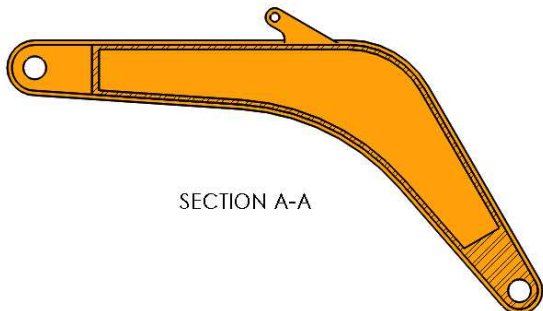
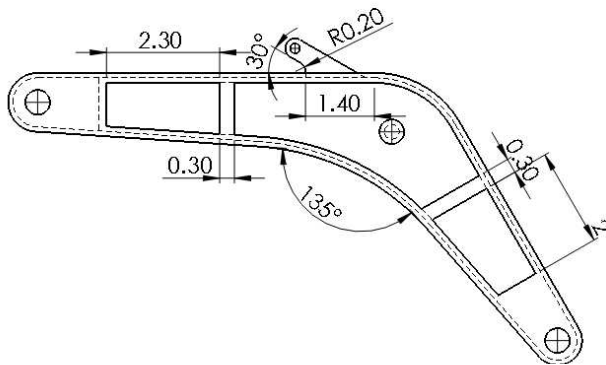
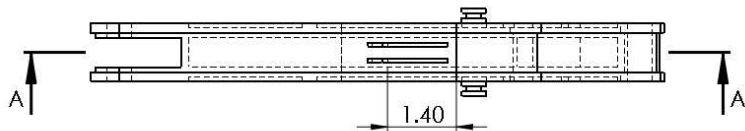
**Part A****Part B**[Next Question >](#)

Reference Image for Q10 of Exam Set 5 >>



SECTION A-A

Part A



SECTION A-A

Part B

Question 11 of 11

EXAM SET 4

For 25 points

Final modifications

Unit system: MKS (m, kg, sec)

Decimal places: 2

Material: Cast Alloy Steel

-Modify the thickness of wall in side surfaces from 0.20 m to 0.10m as described in the images.

-Create two openings as described in the images.

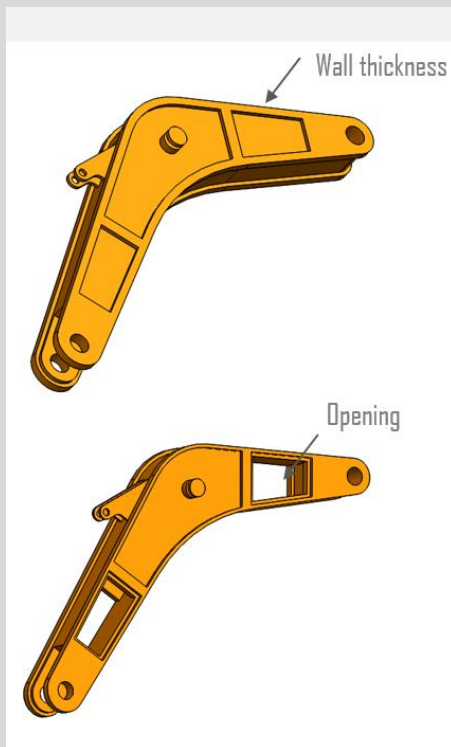
-No other parameters or feature will change.

*Note: The part before the modification is labeled Part A and the part after modification is labeled Part B.

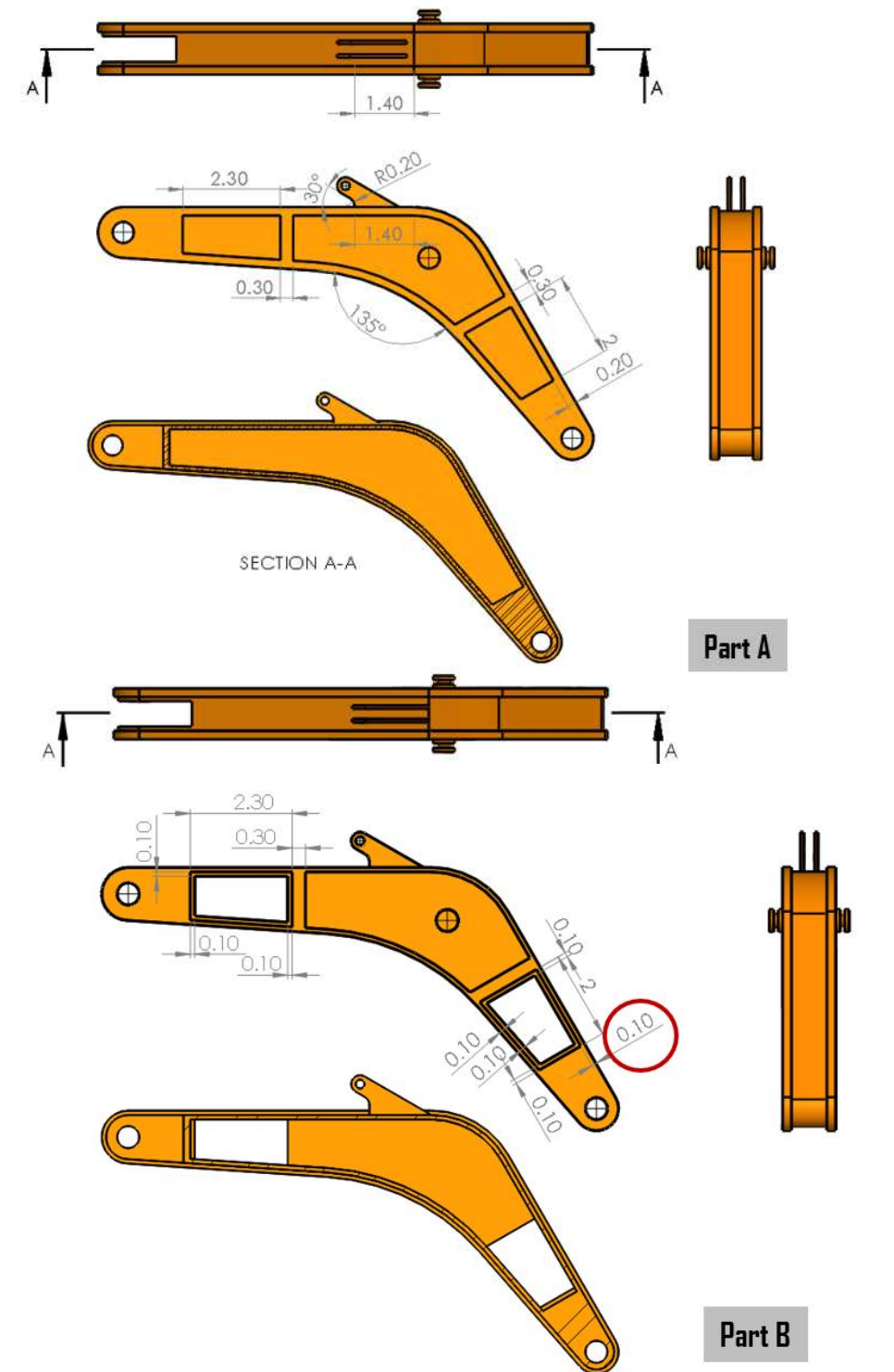
-Measure the mass of the resultant part.

What's the mass of the resultant part? (kg)

Enter Value: []

**Part A****Part B**[Next Question >](#)

Reference Image for Q11 of Exam Set 5 >>



Answer Sheet

EXAM SET 4

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Check configuration number	10	☐ 4
3	Change configuration	10	195.12
4	Create configuration X	15	194.80
5	Change configuration	15	192.67
6	Design table	15	186.99
7	Information	0	
8	Change dimensions	20	87937.38
9	Modify features	20	83610.10
10	Intermediate modifications	25	84470.99
11	Final modifications	25	70289.85
	Total	155	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

- What's your score?
- Do you finish segment 2 test within 40 minutes? ☐ Yes ☐ No
- Do you pass segment 2 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating configuration
 - ☐ Understanding design intent
 - ☐ Using design table
 - ☐ Modifying feature
 - ☐ Repairing warning and error
 - ☐ Creating feature

E N D o f E X A M S E T N o . 4

3.7 Practice Exam Set 5 (Revised format)

Exam Set 5 [Segment 2]

Certified SolidWorks Professional CSWP Segment 2 Test



- Segment 2 Assemblies
 - Analyzing configuration
 - Modifying configuration
 - Understanding design intent
 - Modifying geometry
 - Creating feature

- Test duration: **50 min**
- Total points: **77 points**
- Total Questions: **12**
- Pass score: **104 points**

[Start Examination>](#)

Examination Information

Welcome to the CSWP Segment 2 Core Exam (CSWPCORE)

As per the Candidate Conduct Policy you have agreed to, all models you submit in response to the questions in this SOLIDWORKS Certification exam will be your original work, and you did not reuse any models from a social website or other website. Also, all answers you submit in the SOLIDWORKS Certification exam are your own and you will not obtain any answer from a third party source.

- Your exam is: 12 questions.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have 50 minutes to complete this examination.
- Minimum passing score is: 77 points. (Was 115)
- Your proctor is: Virtual Tester Online

Press the Start Examination button to continue

Start Examination>

Question 1 of 12

For 5 points

Part creation and modification problem set

This test describes the problem set that must be solved in this problem set. Please read this in its entirety before proceeding and click Yes for 5 points.

Please note that the use of other test taker's completed models and assemblies can lead to the annulment of your results per the Candidate Conduct Policy you agreed to.

You will create a part using the drawings and parameters specified in the following questions.

Note: The images shown may not be to proportion depending on the parameters you are given. They are meant as a reference only for the dimensions and parameters used to create the part.

☒ Yes

[Next question >>](#)

Question 2 of 12

For 9 points

Change height of piston

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

Material: 1060 Aluminum Alloy

-Open the attached part.

-Modify the starting part by changing the height of the piston from 120mm to 110mm.
The resultant part is labelled as **Part B** in the images.

*Note: The part before the modification is labelled **Part A** and the part after the modification is labelled **Part B**. (See images). No other parameters or feature dimensions will change.

-Measure the mass of the resultant part

What is the mass of the resultant part (grams)?

☐ 2630.54

☐ 2639.41

☐ 2636.68

☐ 2641.58

Attachment to this question

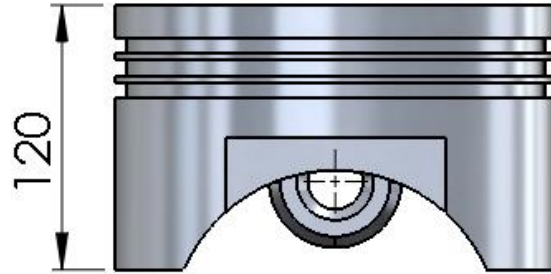


Set5_2_initial.SLDPRT

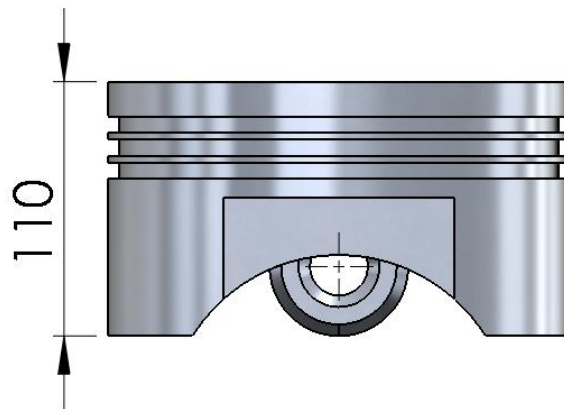
Next question >>

Reference Image for Q2 of Exam Set 5 >>

Part A



Part B



Question 3 of 12

For 9 points

Modification Shell Thickness

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. No other parameters or feature dimensions will change.

-Increase the shell thickness of the piston as shown in image

-Measure the mass of the resultant part.

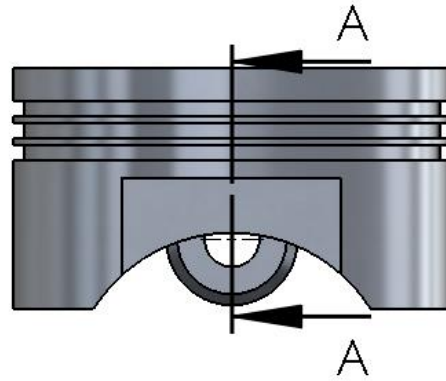
What's the mass of the resultant part? (grams)

Enter values

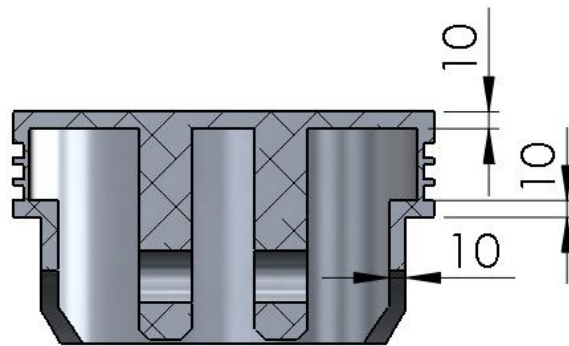
(Use . (Point) as decimal separation)

Next question >>

Reference Image for Q3 of Exam Set 5 >>

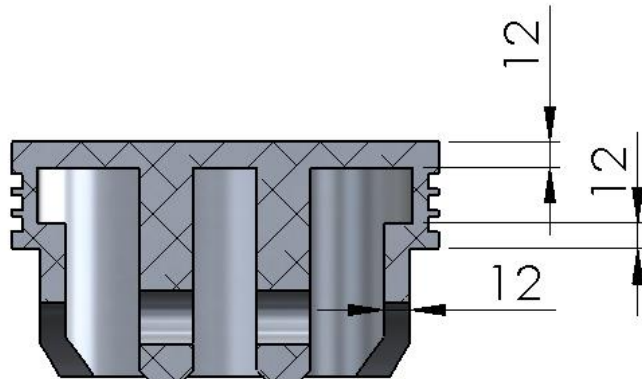


Part A



SECTION A-A

Part B



SECTION A-A

Question 4 of 12

For 9 points

Modify bowl profiles

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. No other parameters or feature dimensions will change

-Modify the bowl profiles of piston crown (See images)

*HINT #1: Pay attention to the profiles and depth of the bowl in Part B.

Use proper cutting method instead of extruding cut. Tester should find value of 'xx' based on the provided drawing.

Note: If you rebuild after adjusting the shell thickness, an error may occur. Find and fix the error.

-Measure the mass of the part.

What is the mass of the part (grams)?

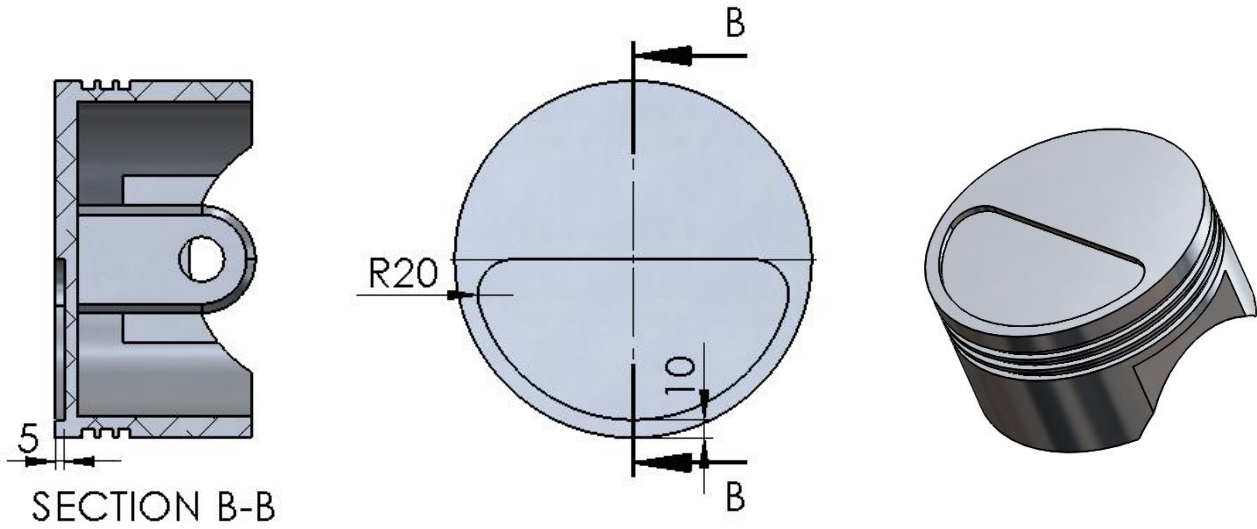
Enter values

(Use . (Point) as decimal separation)

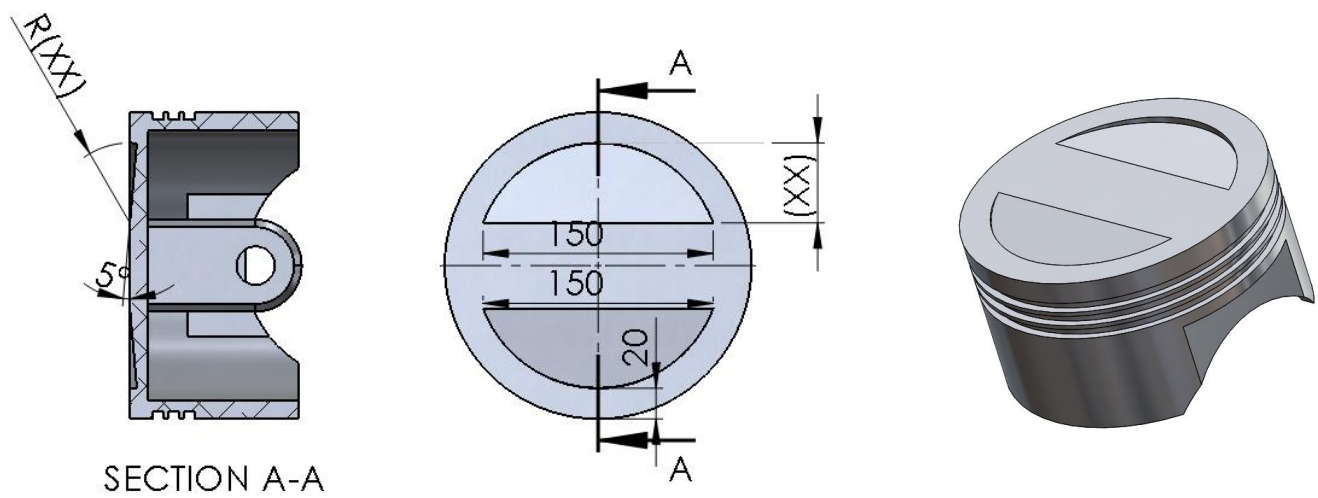
Next question >>

Reference Image for Q4 of Exam Set 6 >>

Part A



Part B



Question 5 of 12

For 9 points

Modify connecting lug

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. No other parameters or feature will change

-Modify the lower connecting link between cylinders. (see images)

-Modify the thickness of the mounting hole cylinder. (see images)

*Note: The part before the modification is labeled Part A and the part after modification is labeled Part **B**.

-Measure the mass of the resultant part.

What's the mass of the resultant part? (grams)

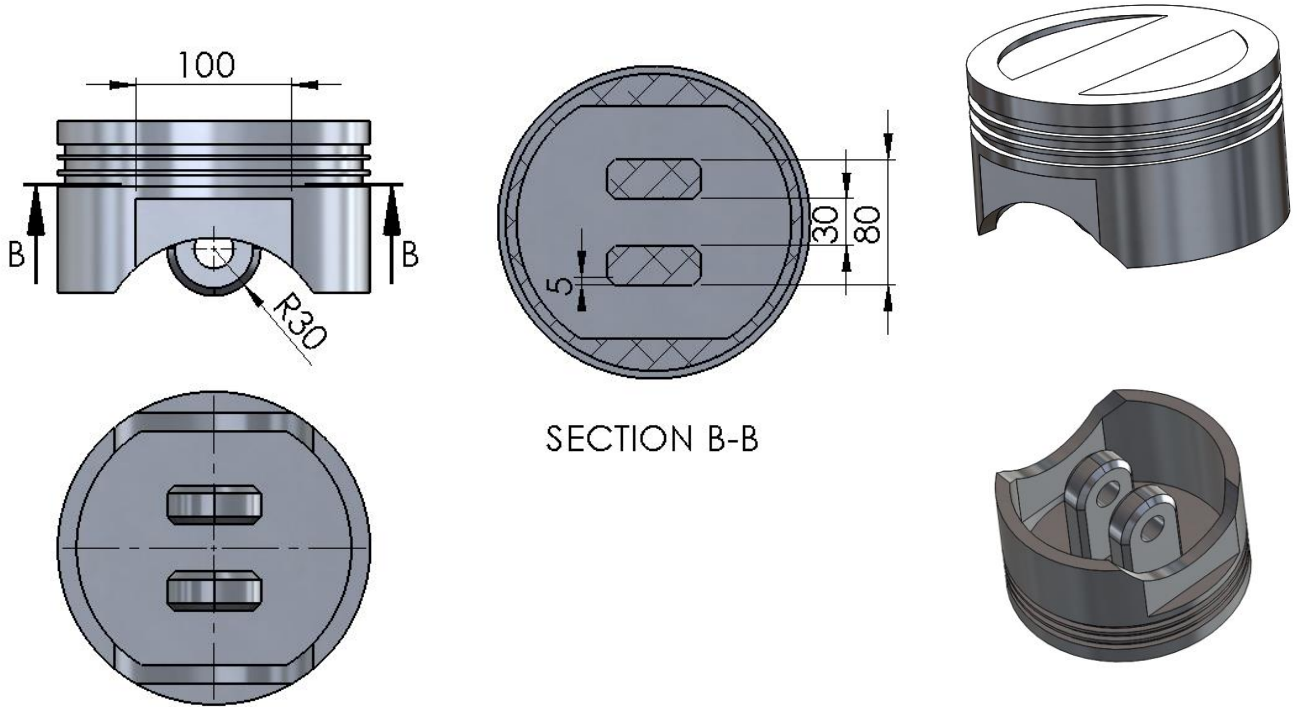
Enter values

(Use . (Point) as decimal separation)

Next question >>

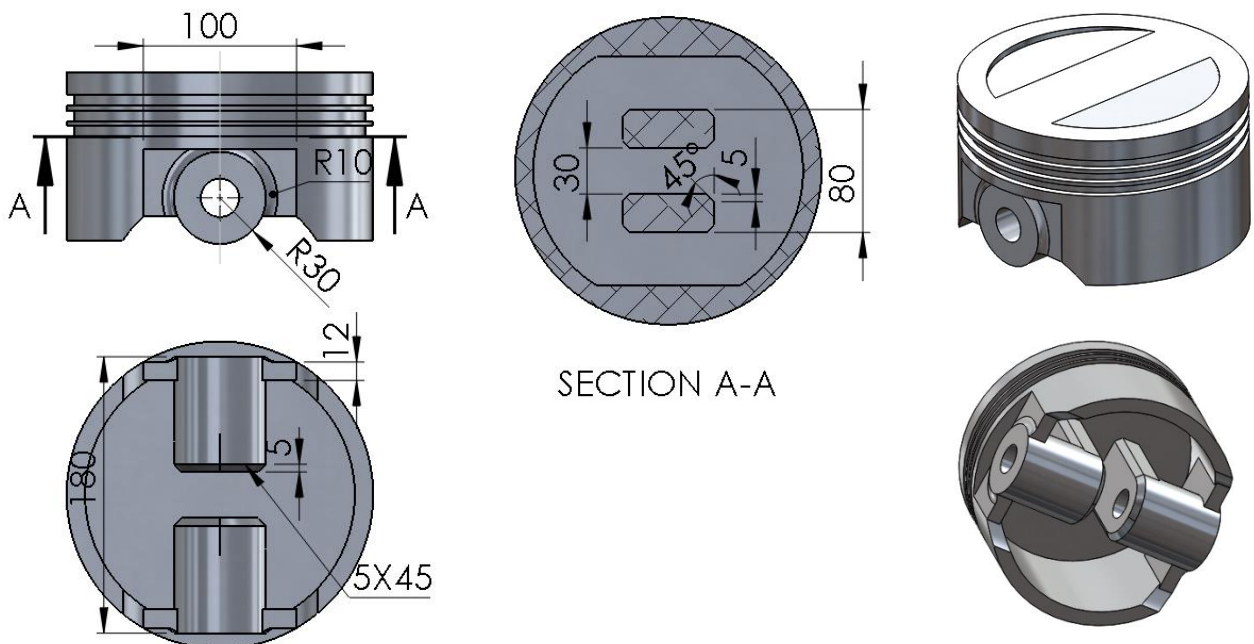
Reference Image for Q5 of Exam Set 6 >>

Part A



SECTION B-B

Part B



SECTION A-A

Question 6 of 12

For 9 points

Add key slots

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. Sketch and feature dimensions should be kept unless directed.

-Add oil drain hole in oil ring slot as shown in following images.

-Measure the mass of the part.

What is the mass of the part (grams)?

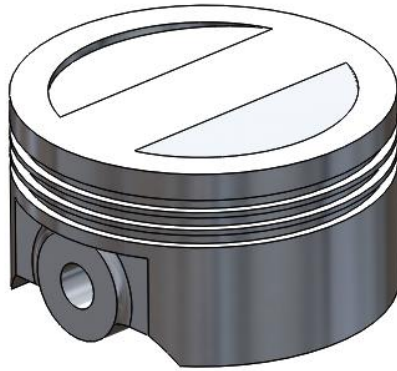
Enter values

(Use . (Point) as decimal separation)

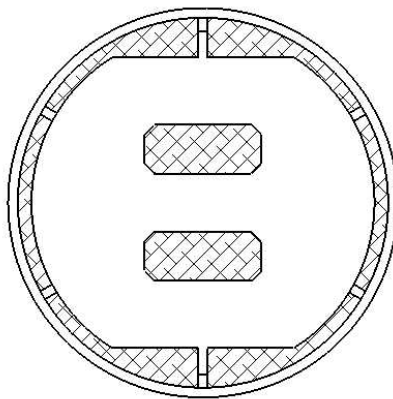
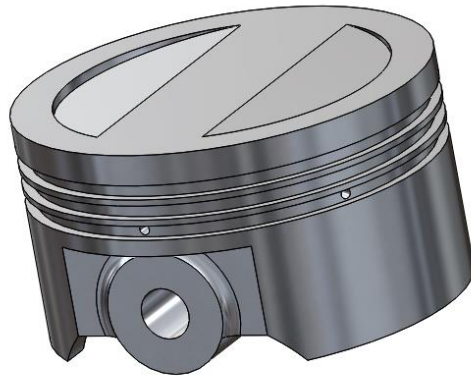
[Next question >>](#)

Reference Image for Q6 of Exam Set 6 >>

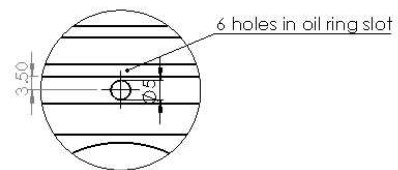
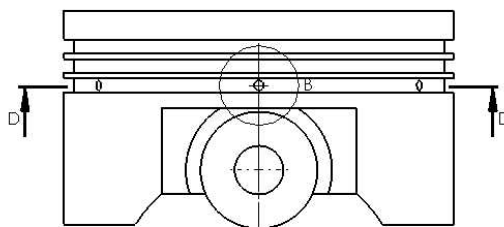
Part A



Part B



SECTION D-D
SCALE 1 : 2



DETAIL B
SCALE 1 : 1

Question 7 of 12

For 9 points

Add thermal slots

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. Sketch and feature dimensions should be kept unless directed.

-Add thermal slots to both skirt side hole as shown in following images.

-Measure the mass of the part.

What is the mass of the part (grams)?

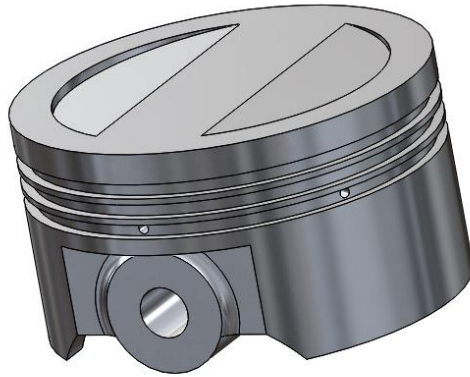
Enter values

(Use . (Point) as decimal separation)

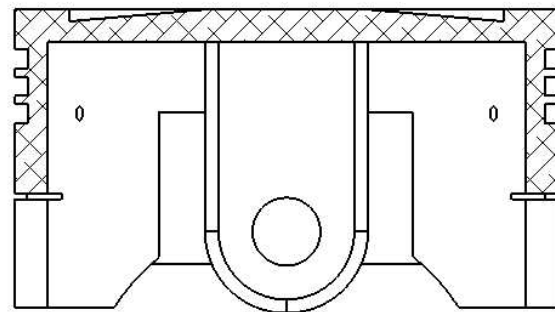
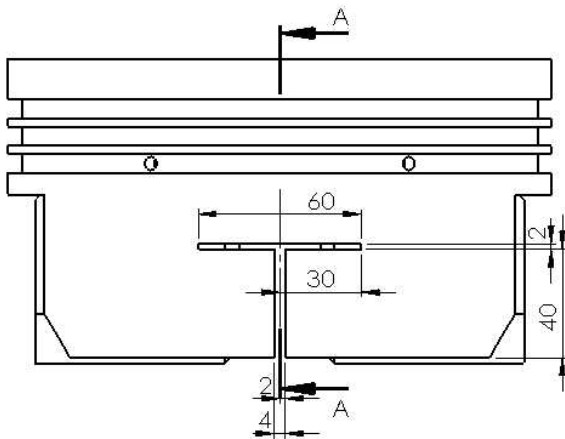
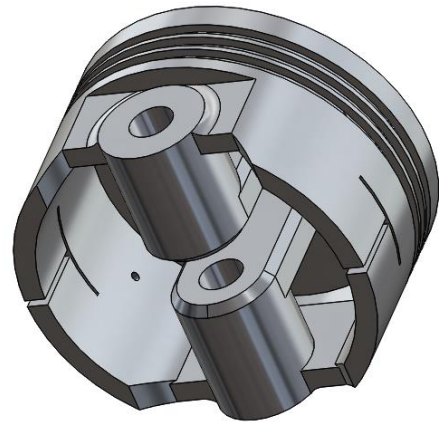
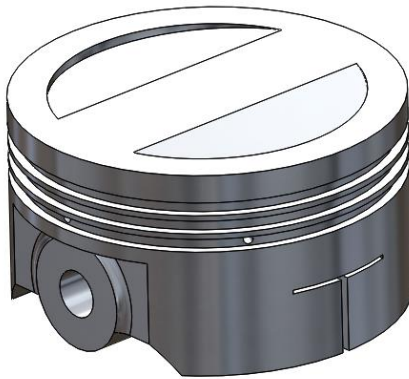
Next question >>

Reference Image for Q7 of Exam Set 6 >>

Part A



Part B



SECTION A-A
SCALE 1:2

Question 8 of 12

For 9 points

Existing configurations

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Open the part Set5_8.SLDPRT

Note: The Color shown in the image may differ from your part depending on the material assigned.

-Determine how many existing configurations there are in the part.

How many existing configurations are there in the downloaded part?

☐ 3☐ 4☐ 5☐ 6

Attachment to this question



Set5_8.SLDPRT



[Next question >>](#)

Question 9 of 12

For 9 points

Switching configuration

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Switch to configuration B
- Measure the mass of the part

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)



Configuration B

[Next question >>](#)

Question 10 of 12

For 9 points

New Configuration 'X'

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Using the part from the last question, create a new configuration named 'Z' based on configuration 'A'.

Note: Copy and Paste to create a new configuration Z may lead to an error in some features in the new configuration. If you decide to use the Copy and Paste method, repair this error in features before you continue.

-Create new configuration named X based on configuration A.

-Create a center cap hole with 10mm depth as indicated in the image that will be suppressed in all other configurations except for X and C. (In other words, in configuration X and C this new feature will be unsuppressed)

-Remaining in configuration X, measure the mass of the part.

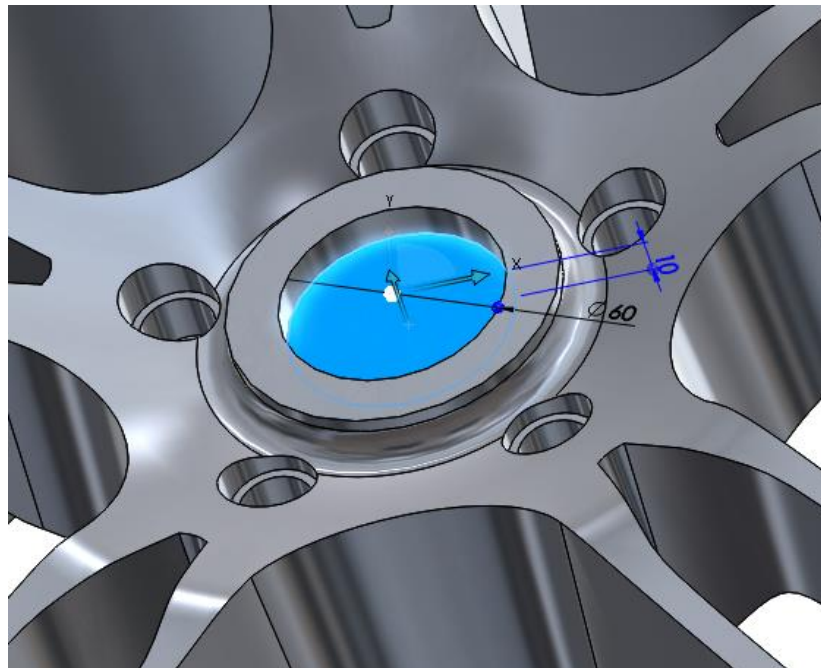
What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q10 of Exam Set 6 >>



Question 11 of 12

For 9 points

Create configuration using design tables

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

- Switching to configuration 'B'
- Create a design table using the 'Auto-create' option
- Create a new configuration 'Z' by copying the row of configuration 'B' in the design table and pasting a new row.
- Change the following parameters in the design table for configuration 'Z' to the following specified values:

D2@Sketch2: 122

D1@Fillet1: 22

D3@Sketch7:4

D2@Sketch8:4

*Note: some parameters need to be found manually (dimensions in equation option)

- Switch to configuration 'Z'
- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Question 12 of 12

For 9 points

Review Design Table

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Using the part from the last question, stay in the current configuration.

*Note: Image shown in the part in configuration Z

*Note: The color shown in the image may differ from your part depending on the material assigned

-Look for the feature 'Cut-Extrude3' in the Feature Manager Design Tree

-Determine in which configuration the feature 'Cut-Extrude3' is suppressed.

In which configurations is the feature 'Cut-Extrude3' suppressed? (Select all that apply)

☐ A ☐ B ☐ C ☐ X ☐ Z

Next question >>

Answer Sheet

EXAM SET 5

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Instruction	5	-
2	Change height	9	☐ 2636.68
3	Modification shell thickness	9	3040.63
4	Modification bowl profile	9	3150.99
5	Modification connecting lug	9	3741.61
6	Add oil drain holes	9	3738.50
7	Add thermal slots	9	3720.22
8	Existing configuration	9	☐ 3
9	Switching configuration	9	37122.31
10	Configuration X	9	41955.69
11	Design Table	9	40895.07
12	Review Configuration	9	☐ A, B, and Z
	Total	107	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 0.5\%$ of provided answers.

Review

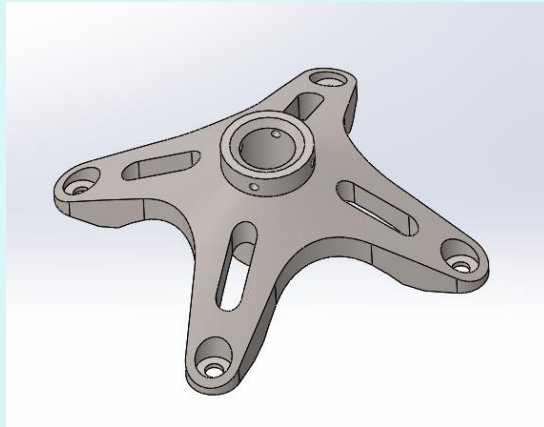
- What's your score?
- Do you finish segment 2 test within 50 minutes? ☐ Yes ☐ No
- Do you pass segment 2 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating configuration
 - ☐ Understanding design intent
 - ☐ Using design table
 - ☐ Modifying feature
 - ☐ Repairing warning and error
 - ☐ Creating feature

E N D o f E X A M S E T N o . 5

3.8 Practice Exam Set 6 (Revised format)

Exam Set 6 [Segment 2]

Certified SolidWorks Professional CSWP Segment 2 Test



- Segment 2 Configurations
 - Analyzing configuration
 - Modifying configuration
 - Understanding design intent
 - Modifying geometry
 - Creating feature

- Test duration: **50 min**
- Total points: **77 points**
- Total Questions: **12**
- Pass score: **104 points**

[Start Examination>](#)

Examination Information

Welcome to the CSWP Segment 2 Core Exam (CSWPCORE)

As per the Candidate Conduct Policy you have agreed to, all models you submit in response to the questions in this SOLIDWORKS Certification exam will be your original work, and you did not reuse any models from a social website or other website. Also, all answers you submit in the SOLIDWORKS Certification exam are your own and you will not obtain any answer from a third party source.

- Your exam is: 12 questions.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have 50 minutes to complete this examination.
- Minimum passing score is: 77 points. (Was 115)
- Your proctor is: Virtual Tester Online

Press the Start Examination button to continue

Start Examination>

Question 1 of 12

For 5 points

Part creation and modification problem set

This test describes the problem set that must be solved in this problem set. Please read this in its entirety before proceeding and click Yes for 5 points.

Please note that the use of other test taker's completed models and assemblies can lead to the annulment of your results per the Candidate Conduct Policy you agreed to.

You will create a part using the drawings and parameters specified in the following questions.

Note: The images shown may not be to proportion depending on the parameters you are given. They are meant as a reference only for the dimensions and parameters used to create the part.

☒ Yes

[Next question >>](#)

Question 2 of 12

For 9 points

Change angle

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Open the part Set6_1.SLDPRT

-Modifying the starting part by adding, removing, or modifying the minimum amount of dimensions or features so that the angle X and radius Y have the following values

X = 40 degree

Y = 3 mm

-Measure the mass of the part.

What is the mass of the part (grams)?

☐ 32.25

☐ 31.27

☐ 32.99

☐ 30.77

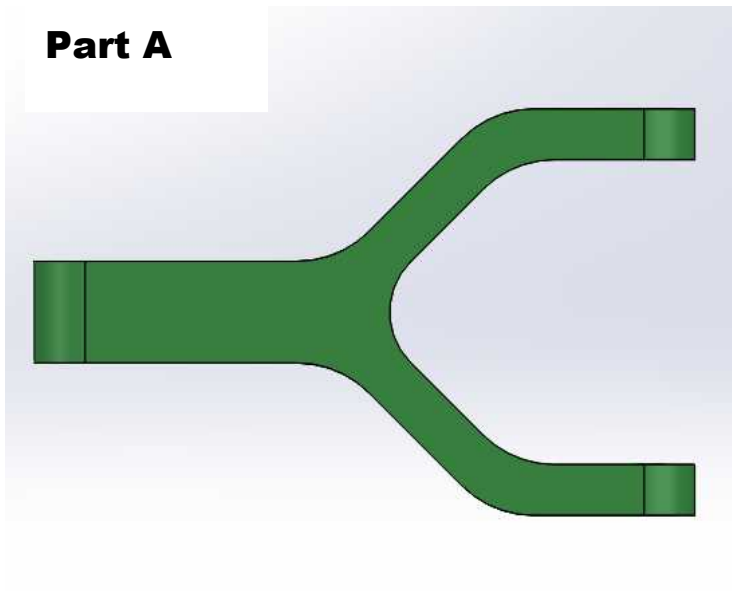
Attachment to this question

 Set6_1.SLDPRT

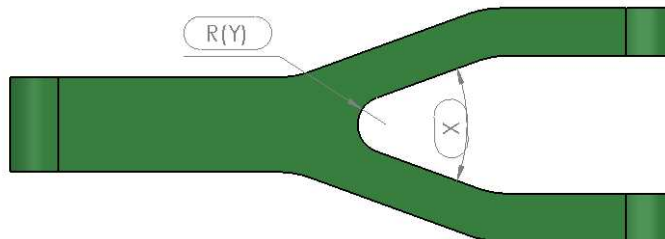
Next question >>

Reference Image for Q2 of Exam Set 6 >>

Part A



Part B



Question 3 of 12

For 9 points

Modification Cutout

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. Sketch and feature dimensions should be kept as it is, unless directed.

-Modify cutout profiles as shown in following images

Note: If you rebuild after modifying the cutout profiles, an error may occur. Find and fix the error.

-Measure the mass of the part.

What is the mass of the part (grams)?

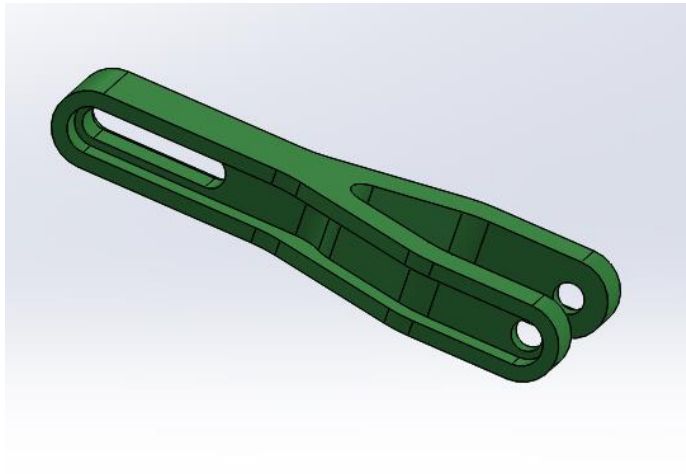
Enter values

(Use . (Point) as decimal separation)

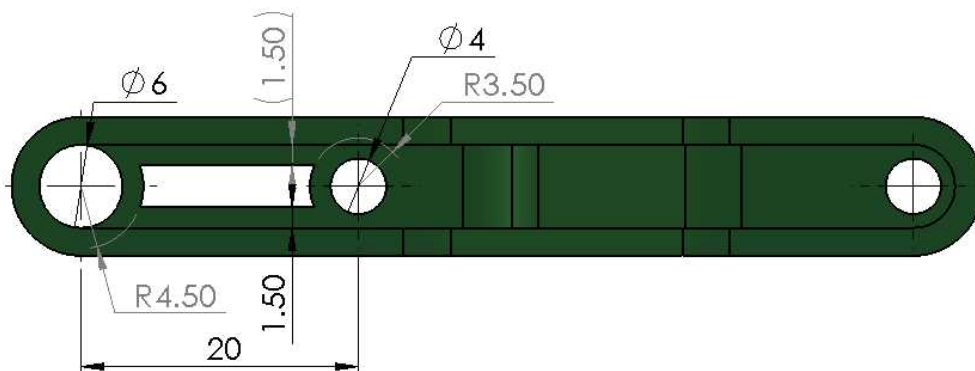
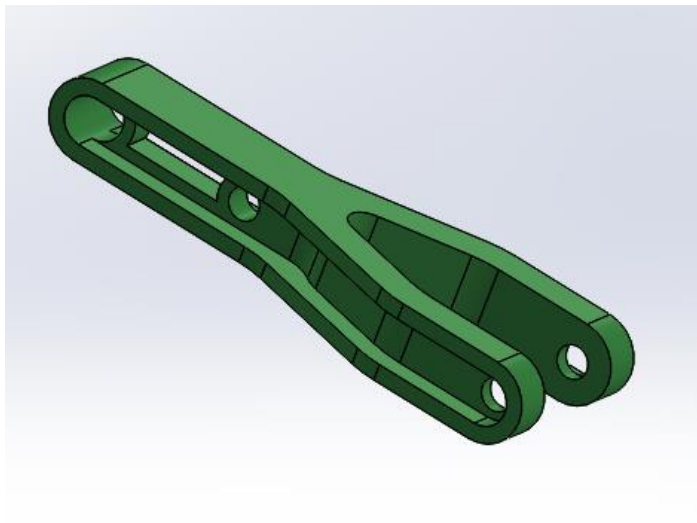
Next question >>

Reference Image for Q3 of Exam Set 6 >>

Part A



Part B



Question 4 of 12

For 9 points

Reduce Shell Thickness

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. Sketch and feature dimensions should be kept unless directed.

-Reduce the shell thickness of the both side from 2mm to 1mm

Note: If you rebuild after adjusting the shell thickness, an error may occur. Find and fix the error.

-Measure the mass of the part.

What is the mass of the part (grams)?

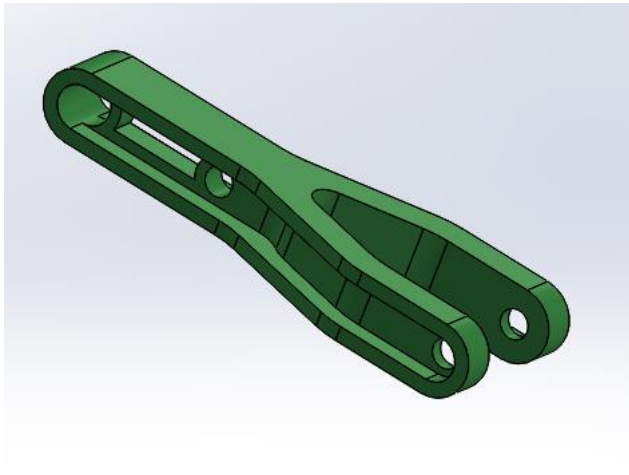
Enter values

(Use . (Point) as decimal separation)

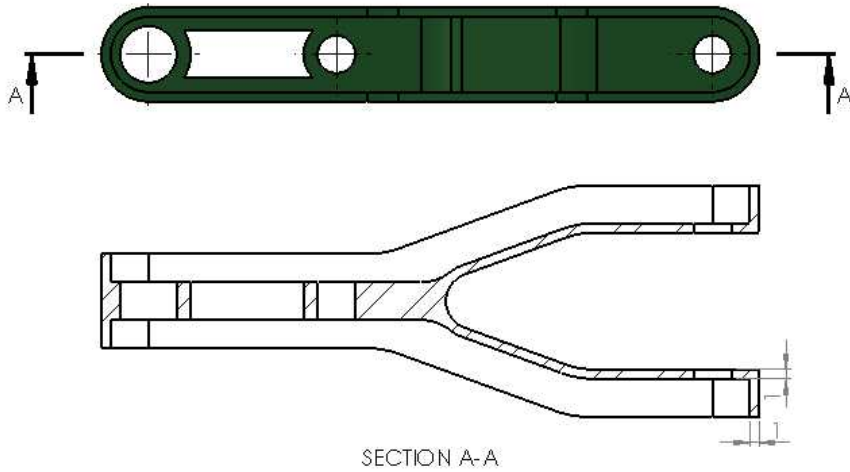
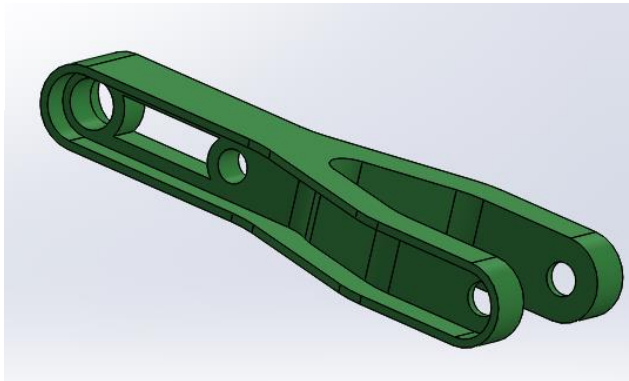
Next question >>

Reference Image for Q3 of Exam Set 6 >>

Part A



Part B



Question 5 of 12

For 9 points

Modify the pocket in one side

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. Sketch and feature dimensions should be kept unless directed.

-Modify the pocket in one side as shown in following images.

-Measure the mass of the part.

What is the mass of the part (grams)?

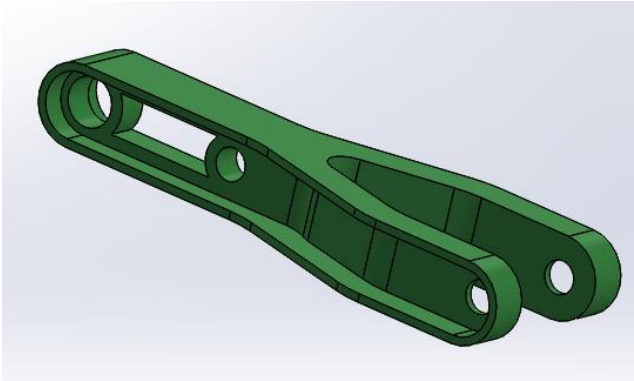
Enter values

(Use . (Point) as decimal separation)

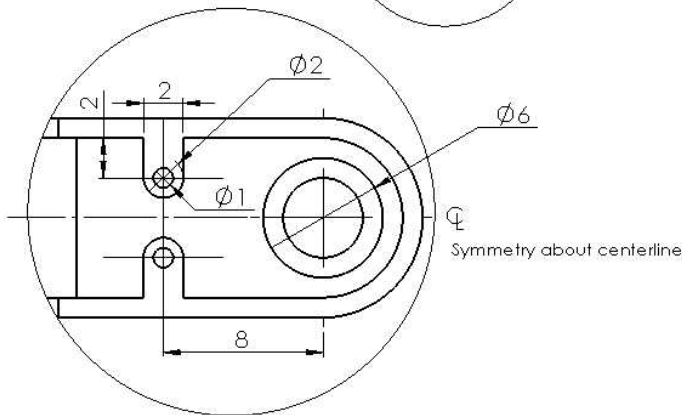
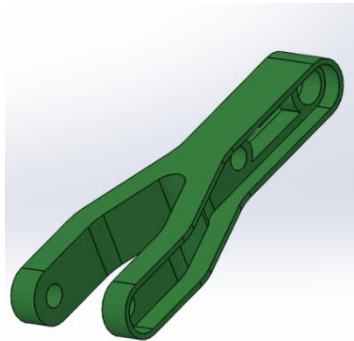
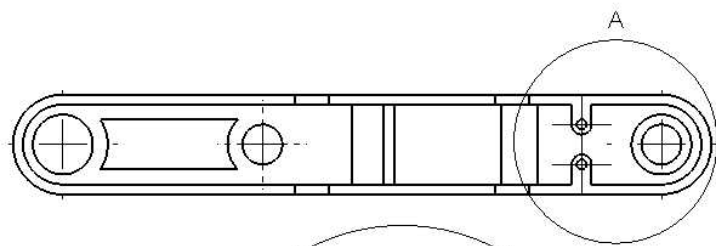
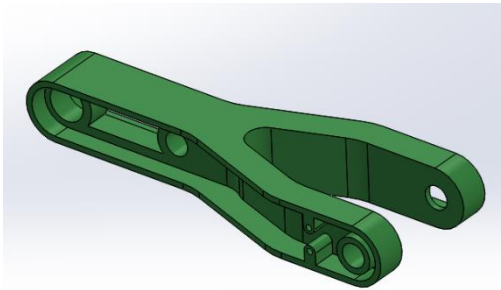
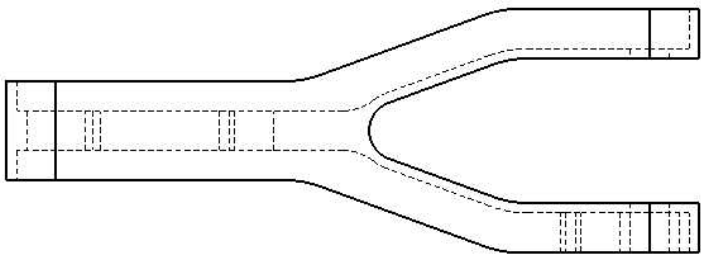
Next question >>

Reference Image for Q5 of Exam Set 6 >>

Part A



Part B



DETAIL A
SCALE 4 : 1

Question 6 of 12

For 9 points

Add key slots

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. Sketch and feature dimensions should be kept unless directed.

-Add key slots on the both sides as shown in following images.

-Measure the mass of the part.

What is the mass of the part (grams)?

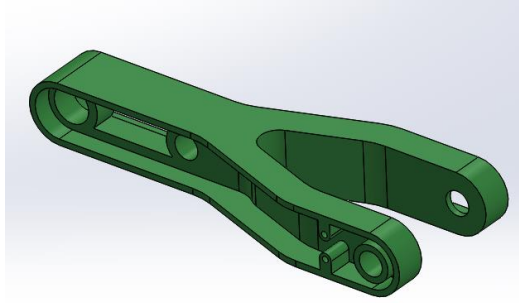
Enter values

(Use . (Point) as decimal separation)

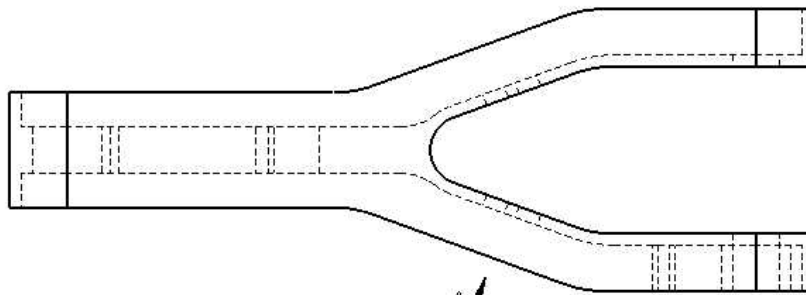
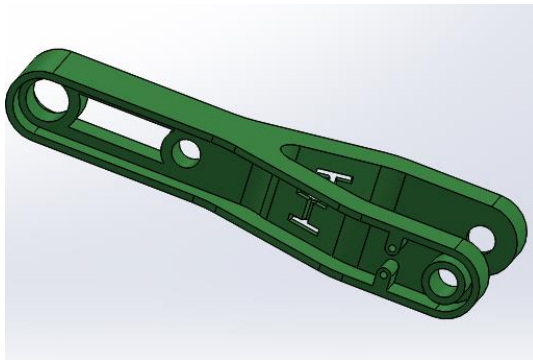
[Next question >>](#)

Reference Image for Q6 of Exam Set 6 >>

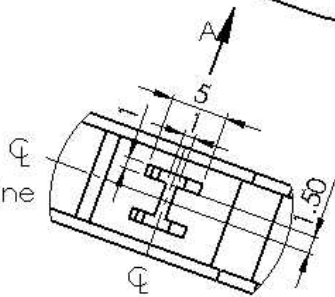
Part A



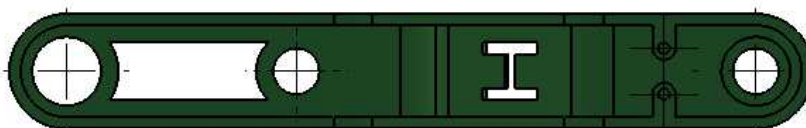
Part B



Key slot profile
is symmetric
about both centerline



VIEW A



Question 7 of 12

For 9 points

Add grooves

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the part from the last question by adding removing or modifying the minimum amount of dimensions or features. Sketch and feature dimensions should be kept unless directed.

-Add grooves to the single side hole as shown in following images.

-Measure the mass of the part.

What is the mass of the part (grams)?

☐ 20.25

☐ 20.36

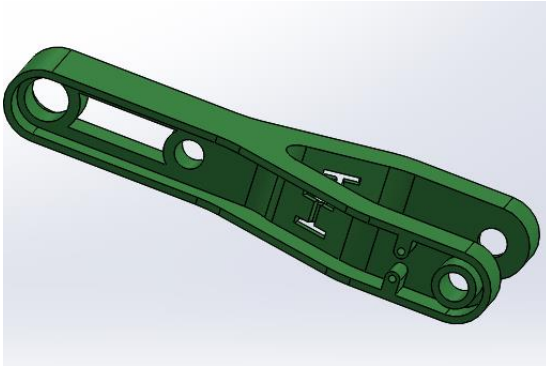
☐ 20.65

☐ 20.77

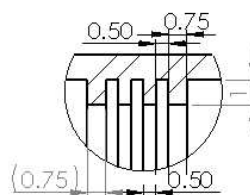
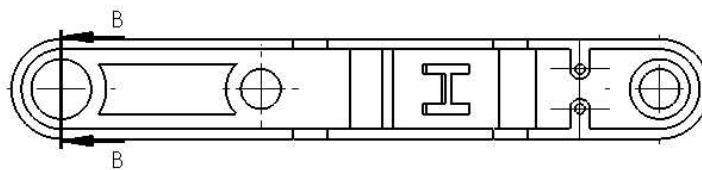
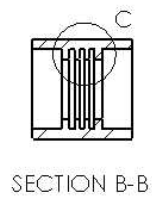
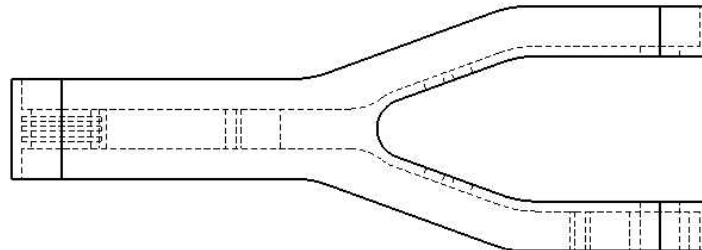
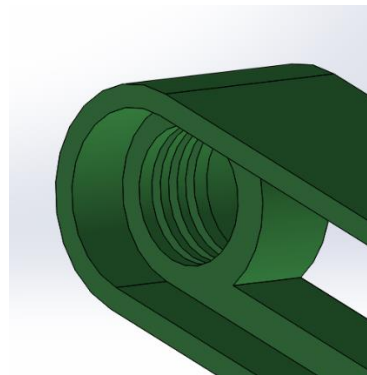
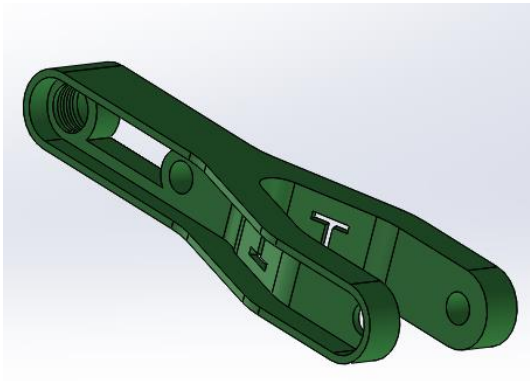
[Next question >>](#)

Reference Image for Q7 of Exam Set 6 >>

Part A



Part B



DETAIL C
SCALE 5:1

Question 8 of 12

For 9 points

Existing configurations

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Open the part Set6_8.SLDPRT

Note: The Color shown in the image may differ from your part depending on the material assigned.

-Determine how many existing configurations there are in the part.

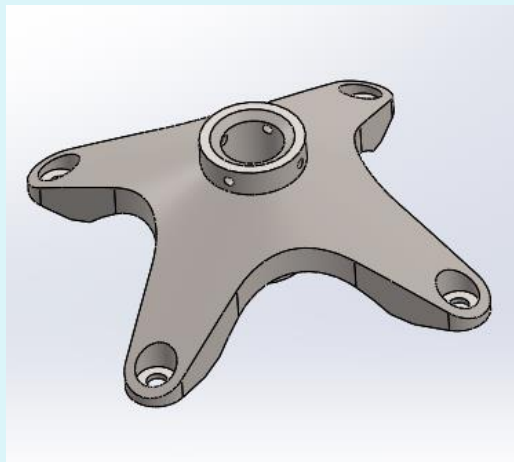
How many existing configurations are there in the downloaded part?

☐ 4☐ 5☐ 6☐ 7

Attachment to this question



Set6_8_initial.SLDPRT

[Next question >>](#)

Question 9 of 12

For 9 points

Switching configuration

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Switch to configuration **C**
- Measure the mass of the part

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Question 10 of 12

For 9 points

New Configuration 'Z'

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Using the part from the last question, create a new configuration named 'Z' based on configuration 'A'.

Note: Copy and Paste to create a new configuration Z may lead to an error in some features in the new configuration. If you decide to use the Copy and Paste method, repair this error in features before you continue.

-Create a pocket hole in four legs as indicated in the image that will be UNSUPPRESSED in configuration Z and B and SUPPRESSED in all the other configurations.

-Remaining in configuration Z, measure the mass of the part.

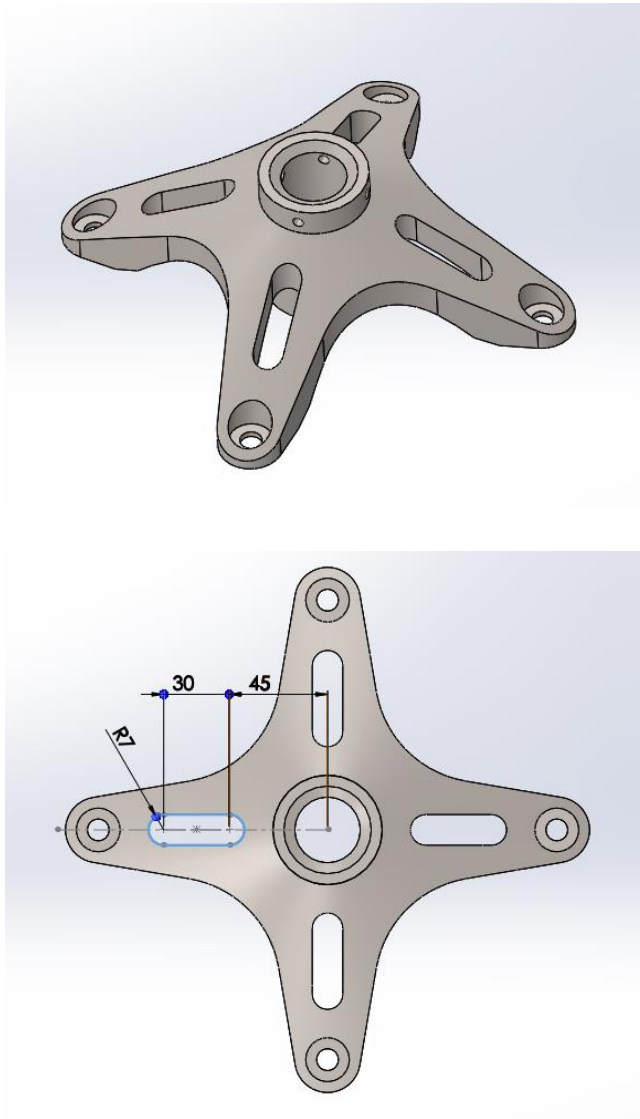
What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q10 of Exam Set 6 >>



Question 11 of 12

For 9 points

Create configuration using design tables

Unit system: MMGS (mm, gram, sec)

Decimal places: 2

- Switching to configuration 'B'
- Create a design table using the 'Auto-create' option
- Create a new configuration 'X' by copying the row of configuration 'B' in the design table and pasting a new row.
- Change the following parameters in the design table for configuration 'X' to the following specified values:

D1@Boss-Extrude1: 60

D1@Fillet1: 45

D1@CirPattern3: 6

*Note: some parameters need to be found manually (dimensions in equation option)

- Switch to configuration 'X'
- Set material of configuration 'X' to be **Copper**.
- Measure the mass of the part.

What is the mass of the part (grams)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Question 12 of 12

For 9 points

Review design table

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Using the part from the last question, stay in the current configuration.

Note: Image shown in the part in configuration X

Note: The color shown in the image may differ from your part depending on the material assigned

-Look for the feature 'CirPattern5' in the Feature Manager Design Tree

-Determine in which configuration the feature 'CirPattern5' is suppressed.

In which configuration is the feature 'CirPattern5' suppressed? (Select all that apply)

☐ A ☐ B ☐ C ☐ D ☐ X ☐ Z

Next question >>

Answer Sheet

EXAM SET 6

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Instruction	5	-
2	Change angle	9	☐ 31.27
3	Modification cutout	9	31.13
4	Reduce shell thickness	9	20.06
5	Modify pocket one side	9	20.79
6	Add key slot	9	20.60
7	Add grooves	9	20.36
8	Existing configuration	9	☐ 4
9	Switching configuration	9	595.46
10	Configuration Z	9	1371.00
11	Design Table	9	2040.91
12	Review Design table	9	☐ A, C, D
	Total	107	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 0.5\%$ of provided answers.

Review

- What's your score?
- Do you finish segment 2 test within 50 minutes? ☐ Yes ☐ No
- Do you pass segment 2 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating configuration
 - ☐ Understanding design intent
 - ☐ Using design table
 - ☐ Modifying feature
 - ☐ Repairing warning and error
 - ☐ Creating feature

E N D o f E X A M S E T N o . 6

IF IT DOESN'T CHALLENGING YOU
IT DOESN'T CHANGE YOU



Street Building, created by the author 2018
SOLIDWORKS modeling with architectural rendering

Part 4

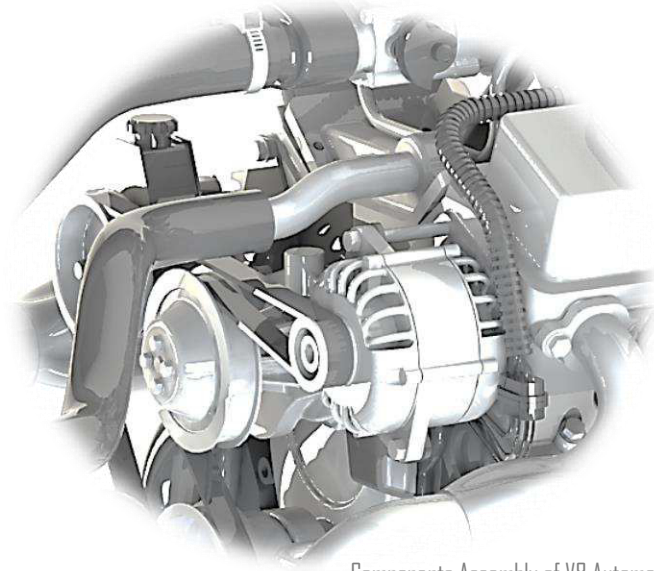
SEGMENT 3: Assemblies

Segment 3 Exam

When you complete this chapter, you will learn and practice

- ▶ Creating an assembly
 - ▶ Adding parts to an assembly
 - ▶ Doing collision detection when moving a part in an assembly
 - ▶ Creating proper mates
 - ▶ Inserting subassemblies
 - ▶ Replacing a part with another part in an assembly
 - ▶ Creating a coordinate system
 - ▶ Using a coordinate system to measure Center of Gravity
-

4.1 Introduction of CSWP SEGMENT 3



Components Assembly of V8 Automobile Engine

Introduction

The third segment has **80 min** with **14 questions** including one instructional question. A total score of **77 points out of 109** or better is required to pass this segment. The previous exam format had 80 min with 13 questions, with a total of 190 points. Each problem set consists of an assembly design that is gradually modified with fill in the blank and multiple-choice questions. In general, if you have some experience with SOLIDWORKS assembly, modeling Segment 3 would be the easiest one. This book contains **6 complete sets** of **Segment One** including two sets of updated format exams used in the current CSWP exam. The revised exam format of the segment 3 test has not changed significantly from the previous tests in covered topics or the discussed question format. It seems that the handling of sub-assembly has become more frequent, and the mate coverage has been slightly expanded. Also, part modeling was not likely included in the revised exam format, and most of the components and sub-assembly will be provided. This segment asks various types of questions as shown below:

- **Create Part and add a part to assembly, measure the center of gravity (COG)**
- **Insert mates in assembly. Width, Parallel, Perpendicular, Dimensional and Angular mates.**
 - * Need to practice all the standard and advanced mates
- **Calculate interference detection and measure distances and angles**
- **Manipulate subassembly with the main assembly. Make it flexible or fixed.**
- **Modify mates and move the reference coordinate system.**
- **Replace components in the assembly.**

Exam overview

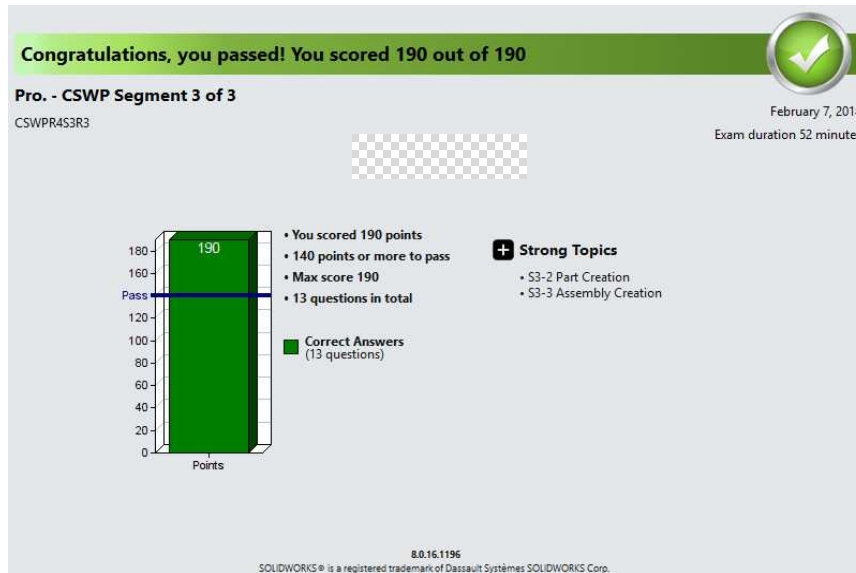
Segment 3 covers assembly in broad-spectrum. However, you don't have to learn everything about the assembly to pass the exam. The following topics are mainly covered in segment 3, so we need to focus on the topics mentioned in this book.

- **Practice all the standard and advanced mates.**
(Popular mates: distance, angle, width, parallel, perpendicular, gear)
- **Collision detection: Move component command**
- **Practice how to make sub-assembly flexible or fixed and manipulate it.**
- **Creating reference coordinate and measure the center of gravity based on it.**
- **Practice the updating a part and replacing the part with download one in the main assembly.**

The below table shows the overall flow of segment 3. It would be helpful for the user to get a big picture of the test. The order of the question could be slightly different depending on the test cases. The answer form could be ‘fill-in-blank’ or ‘multiple-choice’. ‘Multiple choice’ question is a good chance for checking the answer. If your answer does not list in choice, then you must fix the model (usually two or three questions back).

No	Description	Points	Answer type
1	Instruction	5	-
2	Create the main assembly and coordinate system	8	COG / Multi-choice
3	Insert a component into the main assembly.	8	COG/ Fill-in-blanks
4	Insert sub-assembly ① into the main assembly	8	COG/ Fill-in-blanks
5	Insert sub-assembly ② into the main assembly	8	COG/ Fill-in-blanks
6	Move/rotate sub-assembly	8	COG/ Fill-in-blanks
7	Collision detection	8	Fill-in-blanks
8	Create sub-assembly ③	8	COG/ Fill-in-blanks
9	Insert sub-assembly ③ into the main assembly	8	COG/ Fill-in-blanks
10	Modify component/sub-assembly mates properties	8	COG/ Fill-in-blanks
11	Create a new coordinate system and measure COG	8	COG/ Fill-in-blanks
12	Re-orientation component/sub-assembly with specific mates	8	COG/ Fill-in-blanks
13	Interference detection	8	List of components
14	Replace existing part	8	COG/ Fill-in-blanks
	Total	109	Pass points: 77

If you complete the exam and have submitted the answers, then the scorecard will be immediately displayed. The following screenshot is the exam result of the author.



4.2 Mastering Topics for SEGMENT 3 exam

When you complete this section, you should be able to:

Segment 3: Assemblies (80Minutes)

- Creating an assembly
- Adding parts to an assembly
- Doing collision detection when moving a part in an assembly
- Creating proper mates
- Inserting subassemblies
- Replacing a part with another part in an assembly
- Creating a coordinate system
- Using a coordinate system to measure the Center of Gravity(Mass)



Universal joint components

Managing Coordinate Systems

The general form of the questions in Segment 3 is to probe for the **Center of Gravity (Mass)** after assembling the various components in the assembly canvas. Since the **Center of Gravity** is calculated based on the **Coordinate System** at the assigned origin, it is necessary to understand the coordinate system clearly. Since any mistake done in the handling of the coordinate system often results in wrong answers. This chapter explains the manipulating coordinate system for a better understanding of relating questions.

Let's create a new assembly by inserting the two parts as shown below. Each part has its own coordinate and origin. Of these, the first inserted part has **(f) mark** in front of the part name in the model tree, which means a **fixed condition**. If you select a **floating** option by clicking RMB on the part, you can move it freely in the assembly space.

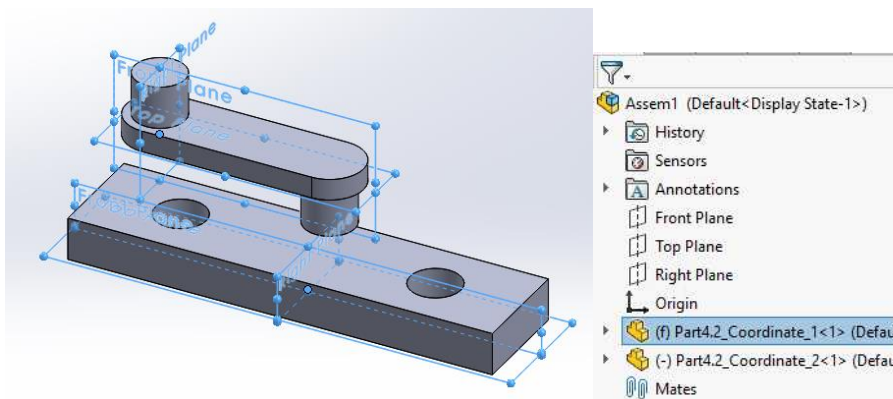


Figure 1 Simple assembly example [P4.2_Coordinate_1 and 2.SLDPRT](#)

Using the standard mates as shown below, align the position and orientation of the components and measure CG using **Evaluate – Mass property** tool.

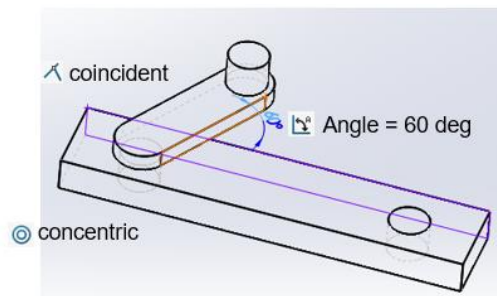


Figure 2 Positioning the connecting arm

The CG is calculated and displayed as follows. In this case, the CG is calculated based on the origin of the default assembly space, unless specified. This value can be calculated differently depending on how you assemble it.

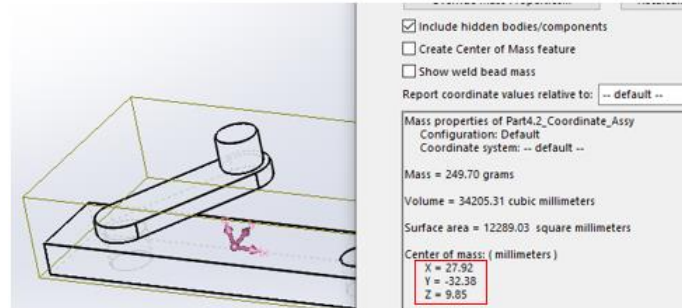


Figure 3 Measure CG relative to the default coordinate system

Now click on the **Coordinate system** in the **Reference geometry** menu on the assembly menu bar to create a new coordinate on a specific point of the base part as shown below. By selecting the **Origin Point**, **x-axis** and **y-axis**, you can create a coordinate system at a specific position and orientation.

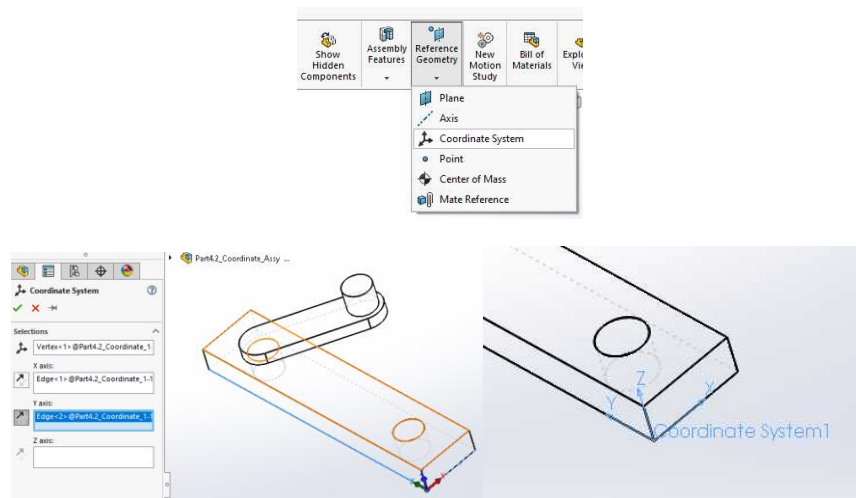


Figure 4 Create a new coordinate system

If you calculate the CG based on the created Coordinate System (**Coordinate system1**) using the **Mass property** tool, you can get the following values. In Segment # 3, evaluating correct CG is queried while creating or changing a coordinate system at an arbitrary point.

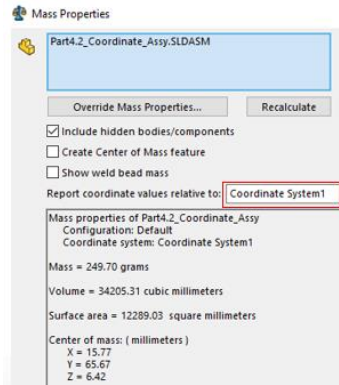


Figure 5 Measure CG based on a new coordinate system

Hands-On Practice Coordinate System #1

- Practice time: 10 min
- Unit: MMGS (decimal digit 2)
- Instruction:
 - Assemble the provided components using the standard mate based on the images below.
 - Create a new coordinate system as shown and calculate the CG relative to the created coordinate system.
- Answer CG: **X=69.66, Y=18.07, Z=8.75**

Practice

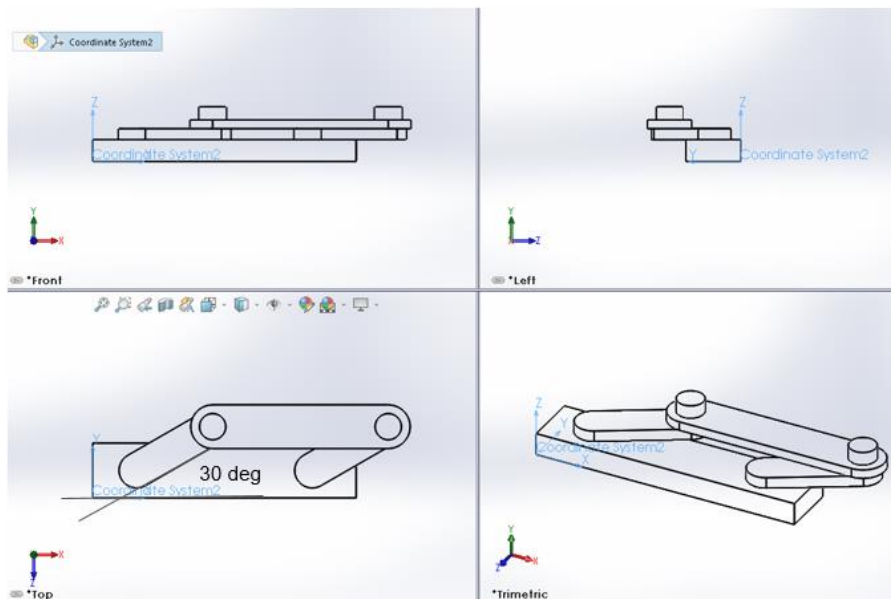


Figure 6 Drawing for coordinate practice P4.2_Coordinate_Assy.SLDASM

Utilizing Mate

The mate tool is used to align components to create an assembly. There are three types of mates used in SOLIDWORKS.

- **Standard mates:**

Coincident, Parallel, Perpendicular, Tangent, Concentric, Angle mate, Distance mate

- **Advanced mates:**

Symmetry mate, Width mate, Limit mate, Profile center mate, Path mate, Linear/coupler mate

- **Mechanical mates:**

Slot, Hinge, Gear, Rack and Pinion, Screw, Universal Joint

In Segment # 3, there are problems with positioning components using various standard mates. Among the advanced mates, the mostly used mate is the **Width mate**, so you need to get familiar with how to use it. This chapter introduces the assembly using the various mates used in Segment # 3.

Common Mates Practice

Mechanical structures that often appear in Segment 3 are structures such as robotic arms or vise consists of various components. Familiarity with these structures will also help to understand the test questions, as they require the application of various mates to move or rotate in multi-directions. The following images show a simple assembly of knuckle joint that consists of five parts. We will use this assembly to practice the mates commonly used in segment 3.

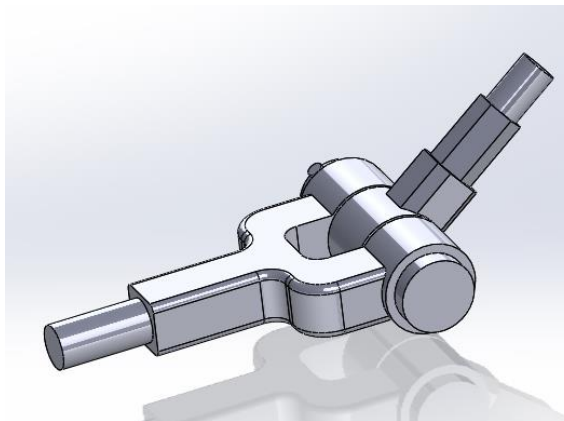


Figure 7 Mate Practice Assembly  P4.2_Mate_1.SLDASM

To practice how to create assembly and how to use mates, we will start an assembly file and add the following parts to it. The provided parts are shown as follows:

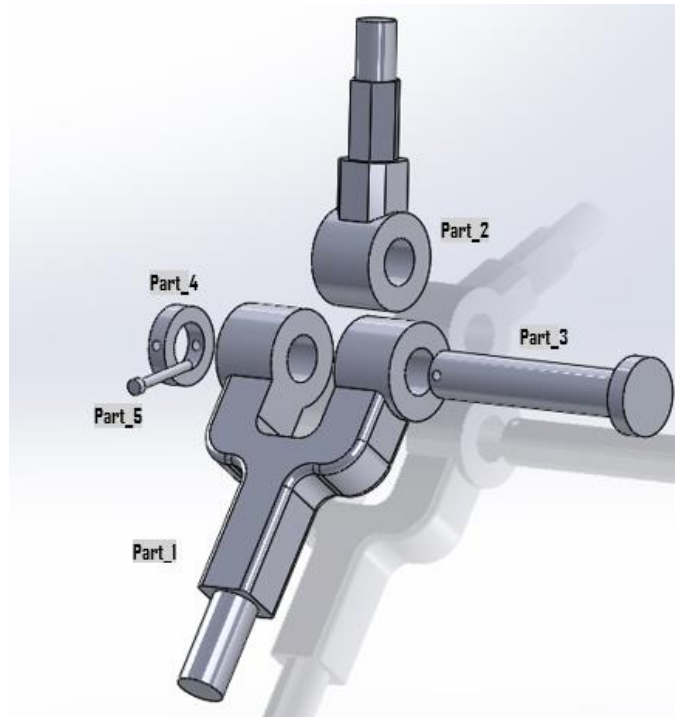


Figure 8 Knuckle joint assembly components

First of all, create the assembly consisted of two parts (part_1 and part_2). Create a new assembly as shown in the screenshot. Then, select two parts that need to be added to the assembly.

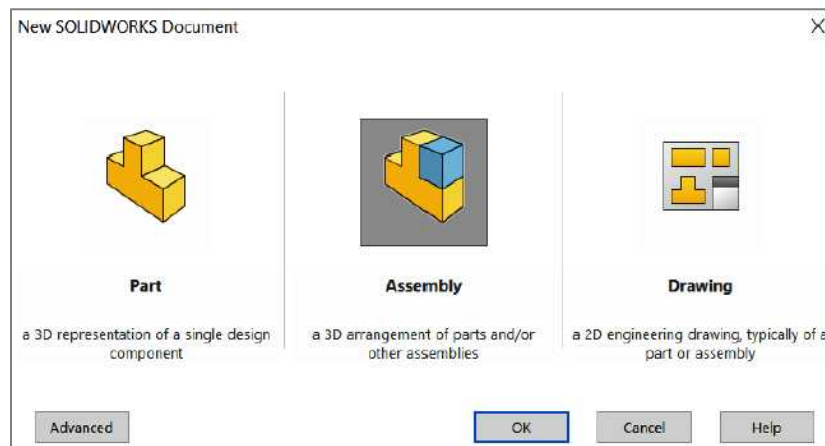


Figure 9 Create a new assembly screenshot

Import the first part (part_1) into the assembly canvas and place it anywhere. To add the second part, we can click on **Insert** → **Components** → **Existing Part**. The position of individual parts within the assembly space can be classified into three states:

- **Fixed parts:** Does not move in the assembly and are fully defined. The first part is fixed by default
- **Floated parts:** It can be moved around since they are not defined. Mates can floating parts to be fixed.
- **Dragging parts:** You can click and hold the part and move it around the canvas.

Fixed and Float conditions can be exchanged at any time by RMB over the corresponding part in the model tree.

Part_2 should be placed in the center between the two holes of **Part_1** so that they can rotate freely. The advanced mate that can be used for this purpose is **Width**. The width mate is often used as a replacement for symmetry mates in a situation where parts are modeled with some tolerance and have a gap rather than touching face to face. The Width mate requires two pairs of faces to be selected, and it works particularly well with a part which is spaced evenly between two faces.

First, select both holes inner surfaces inside of **Part_1**, select the hole outer surface of **Part_2**, and select **Centered** for the constraint option. As shown in the figure below, the second part is positioned exactly at the center with equal spacing on both sides. It is one of the advanced mates that is frequently used in CSWP segment # 3, so the user should learn how to use it correctly.

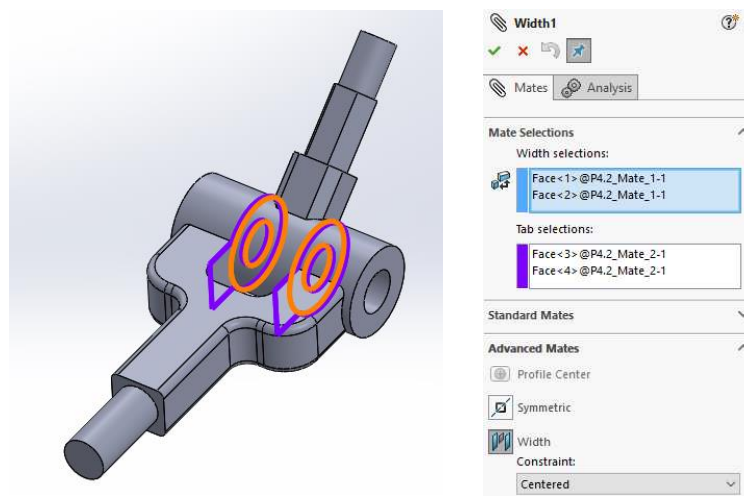


Figure 10 Width Mate setup configuration

Let's complete the knuckle joint assembly by assembling **part_1 ~ Part_5** using the standard mates as shown below. The CSWP exam presents assembly positioning problems that use both standard mates and some of the advanced mates, so you should learn how to use them.

- **Coincident**
- **Parallel**
- **Perpendicular**
- **Tangent**
- **Concentric**
- **Lock**
- **Distance**
- **Angle**

The figure below shows the mates and assembly status. Standard mates are very straightforward to use, so it can be used intuitively. Some standard mates require us to input numerical value, such as the **Distance** and **Angle**. It is recommended to practice creating this assembly with mates using the provided components. To find the definition status of each part in the assembly, we can look at the assembly design tree. The **(f)** symbol before the part name in the design tree means **fixed**, **(+)** means **overdefined**, and **(-)** means **underdefined**. The meaning of no symbol is **fully defined**. Finding out the status of each part will help us when we need to define our assemblies. With this, we can decide which part needs more mates, or which mate we have to modify to fix the error.

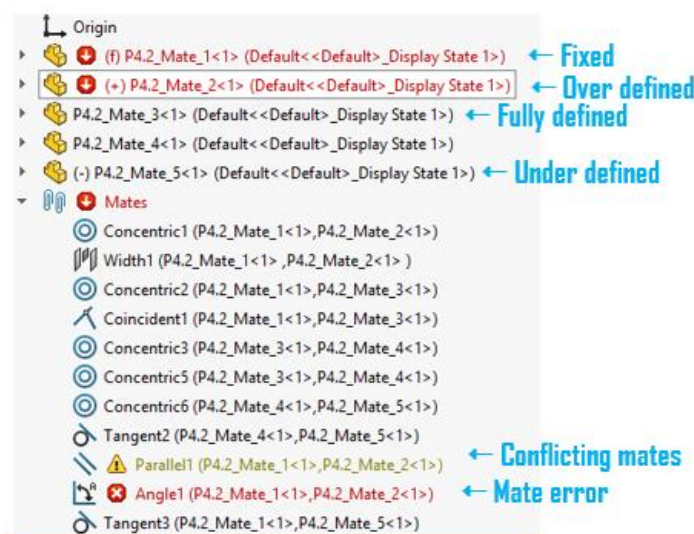


Figure 11 Part status symbol examples

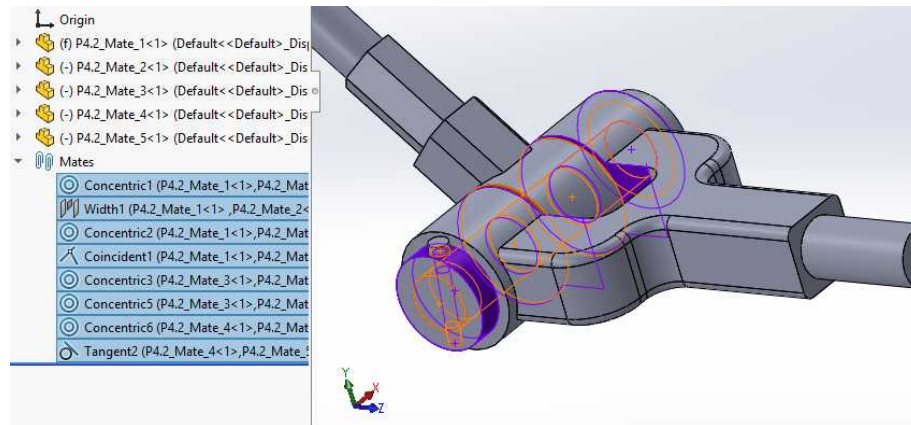


Figure 12 Assembly status and used mates [P4.2_Mate_1.SLDASM](#)

Applying standard mates can be created without any difficulty. Let's apply **tangent** mate to the relationship between the head bottom surface of the fixed pin (part_5) and the outer surface of part_4 as shown below. After doing this, let's calculate the mass. The resulting mass is 58.58 grams

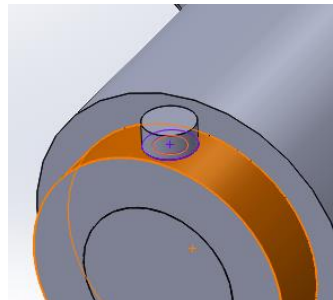


Figure 13 Tangent mate between Part_4 and Part_5

Then, create a new coordinate system as shown in the below image. Also, create an **angle** mate of **135 degrees** between the arms of the knuckle joint and add a parallel mate so that the fixing pin and nut do not rotate together.

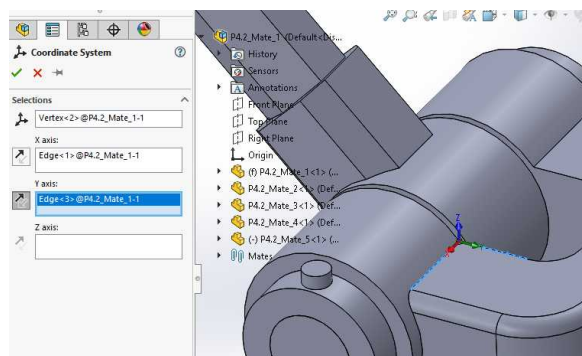


Figure 14 New coordinate system setup

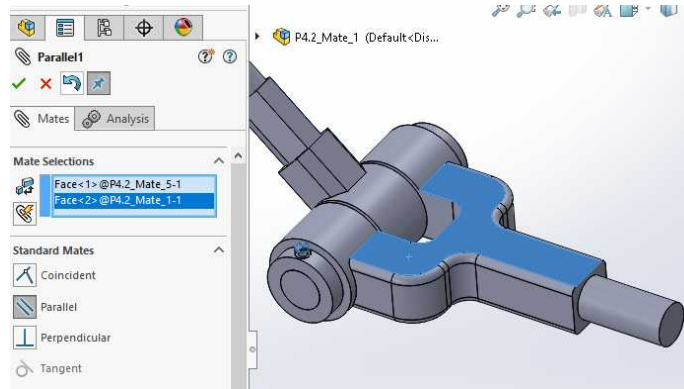


Figure 15 Parallel mate setup

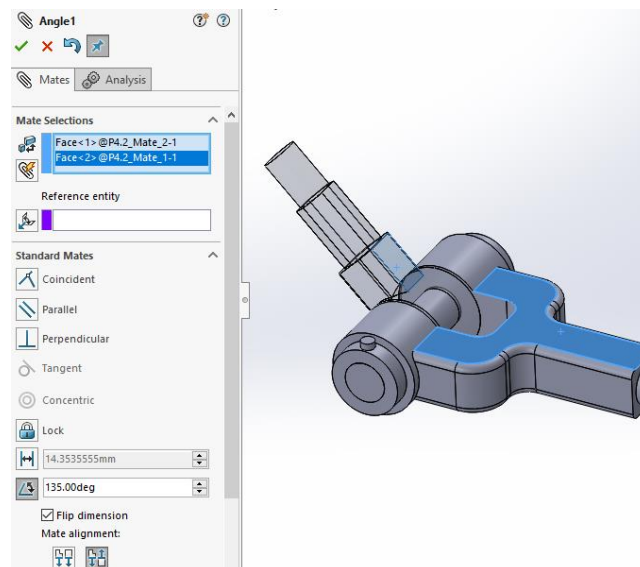


Figure 16 Angle mate 135 degrees between arms of knuckle joint

Now you can see that the symbols like (+) and (-) in front of part names in the model tree have disappeared. The pin (part_5) is still marked (-), and you can see that it can only be rotated by dragging the part. Since it is an axisymmetric shape, it does not affect the mass or CG. In the current state, select the arm of the knuckle joint and try to drag it. The message **‘The selected component is fully defined. It can't be moved’** is displayed. In this state, measure the CG based on the created coordinate system. It is calculated as $X = -10.02$, $Y = -20.42$, $Z = 2.93$. Follow these procedures yourself using the provided parts and compare the results.

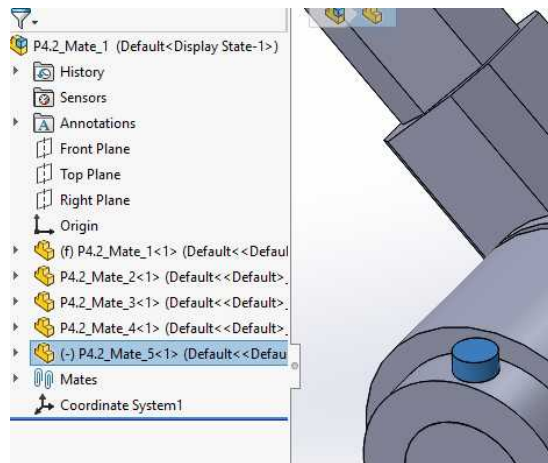


Figure 17 Parts mate conditions in the model tree.

Hands-On Practice Mate #1

Practice

- Practice time: 20 min
- Unit: MMGS (decimal digit 2)
- Instruction:
 - Assemble the provided components using the standard mate based on the images below.
 - Create a new coordinate system as shown and calculate the CG based on it.
- **Answer CG: X=96.07, Y=51.07, Z=27.15**

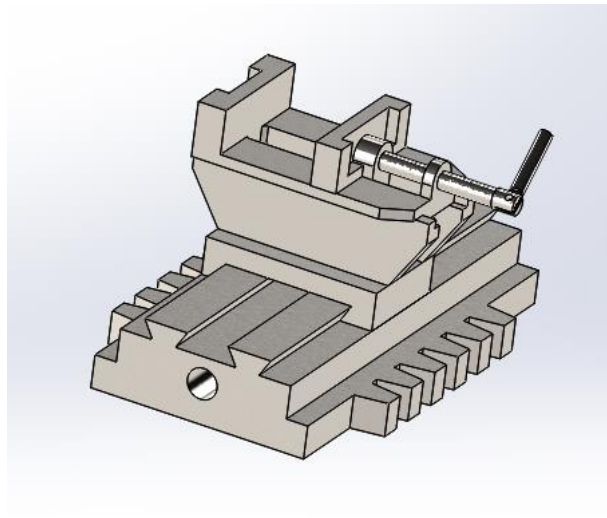


Figure 18 Vise assembly for mate practice [P4.2_MatePractice_No1.SLDASM](#)

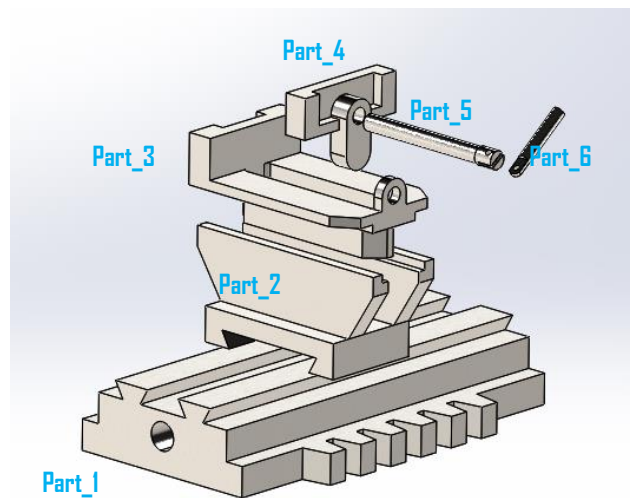


Figure 19 Assembly components

* refer to detailed mate conditions in next page

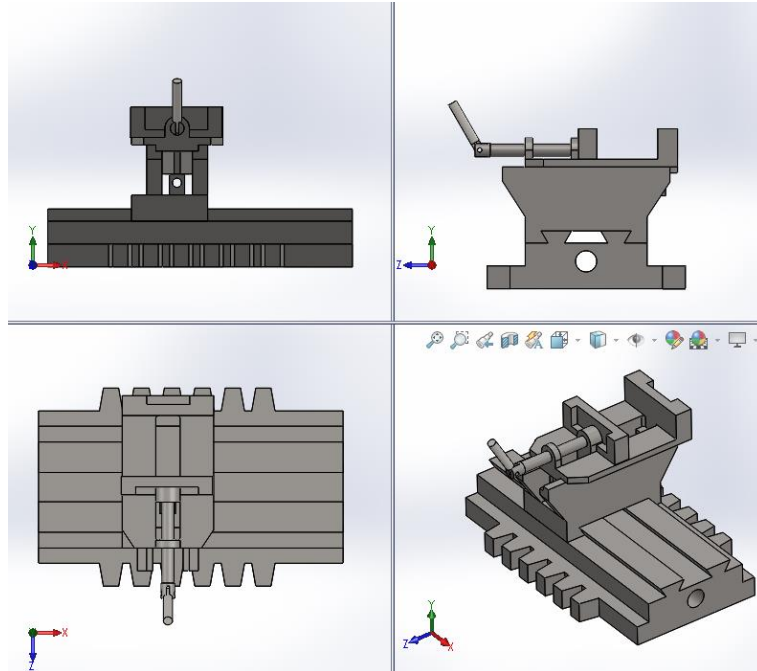


Figure 20 Assembled status

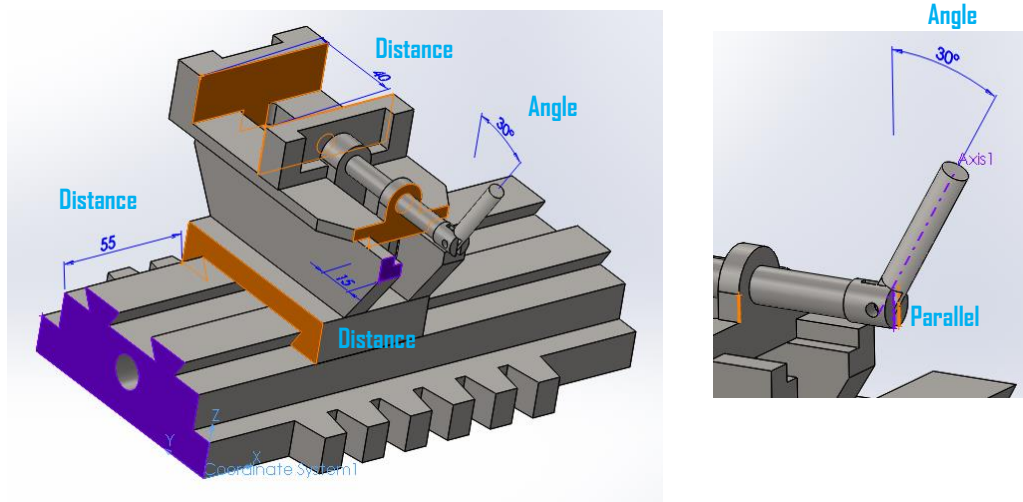


Figure 21 Important mates and new coordinate system

Report coordinate values relative to:	Coordinate System1
Mass properties of P4.2_MatePractice_1	
Configuration: Default	
Coordinate system: Coordinate System1	
Mass = 5647.43 grams	
Volume = 773556.24 cubic millimeters	
Surface area = 147676.47 square millimeters	
Center of mass: (millimeters)	
X =	96.07
Y =	51.07
Z =	27.15

Figure 22 Calculated CG

Gear Mates

Generally, complex mates would not be included in the Segment 3 exam. In recent years, the CSWP exam tends to cover expanded types of mates. The width mate among the advanced mates is often applied to the testing model, and it is possible to include the gear mate among the mechanical mates, so it is necessary to learn how to use it correctly.

The gear mate enables one to establish gear type relations including gear ratios and directions without any actual physical connections. You have to define the ratio using the Number of teeth for gears. Their pitch diameter or number of revolutions could also be used. To apply this relation, cylindrical faces or circular edges of each gear have to be selected. The below model shown is one example of the assembly using gear mate. Open the provided gear assembly and practice the gear mate.

To create a gear mate, go into **Assembly**→**Mates**→**Mechanical mates** in the property manager. You will have to select two circular references to create a mate between the two components. For example, you can choose the pitch circle on each gear. By default, the ratio will be set based on the diameter of the circles selected but you can manually change this ratio in the gear mates dialogue boxes.

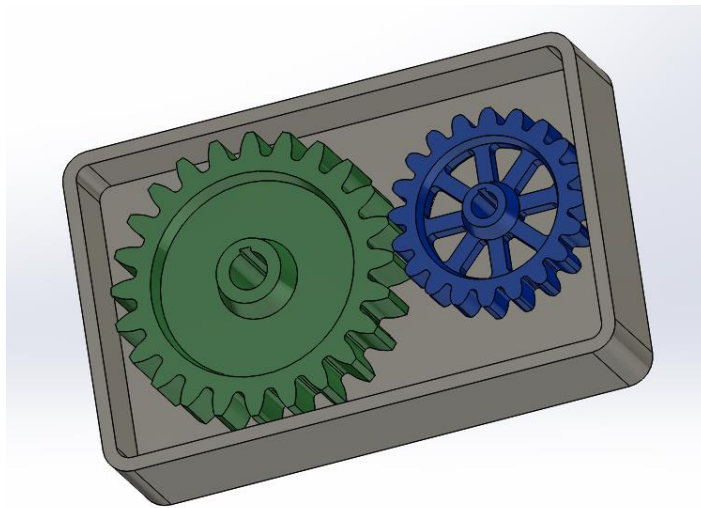


Figure 23 Gear mate example [▶ P4.2_GearMate_NI.SLDASM](#)

Before proceeding with the setup of the gear mates, it is required to manually align both gears so the teeth are exactly between each other to avoid interference. In this example, there are two parallel mates to set up the initial condition as shown below. After alignment of the gear, then suppress it to assign gear mate.

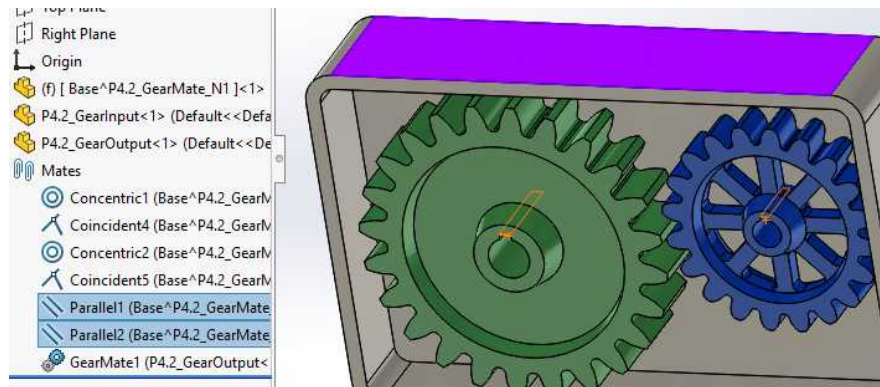


Figure 24 Parallel mates to setup initial condition

To assign gear mates, you have decided what gear ratios are. If one is half the size of the other, it will have half the teeth, and the gear ratio will be 1:2. This example uses the number of teeth for gear ratio. Select any circular faces of edges in both gears and input the number of gear teeth for both gears, 24 and 20 respectively as shown below. Then, grab the one gear and rotate them. If the gears rotate the same direction, check the reverse in the property manager. There are many complex gear applications in mechanical assemblies. However, the exam would use this type of simple spur gear application for testing purposes.

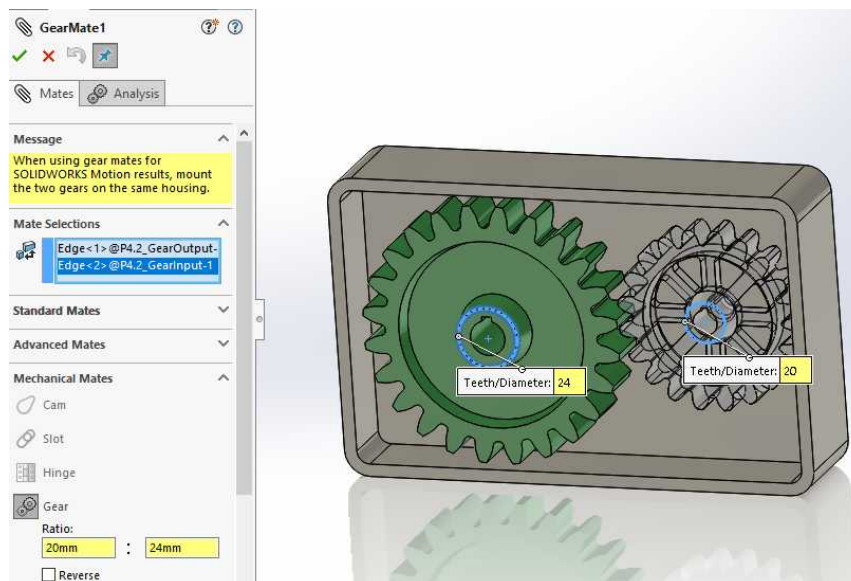


Figure 25 Setup of gear mate

Utilizing Interference and Collision Detection Tools

In segment 3, there will be 2 ~ 3 problems related to proximity measurement of the components. SOLIDWORKS has several tools that are meant to detect proximity between parts in an assembly such as **Interference Detection**, **Collision Detection**, **Clearance Verification**, **Physical Dynamics**, and **Sensors**. Among them, frequently **Interference detection** in Evaluate Tools and **Collision Detection** in Move tools will be used to solve the question.

Interference detection is available through the menus at **Tools** → **Evaluate** → **Interference Detection**. There will be two different types of selections for interference detection. The first one is to select all assembly from the assembly **Feature Manager**. The second one is to select individual components such as parts or subassemblies again from the assembly **Feature Manager**. After calculation of interference, the interfered components are listed with the volume size of the interferences. The interfering volume highlights in red in the assembly canvas.

Let's modify the mates in the models which were previously used for Hands-on practice as shown below. Increase the distance mate between the upper components of the Vise by 15mm to 30mm. Then use the **Interference Detection** tool to see which components are interfering or not. In CSWP segment 3, there is a problem identifying which components are interfering under particular mate conditions.

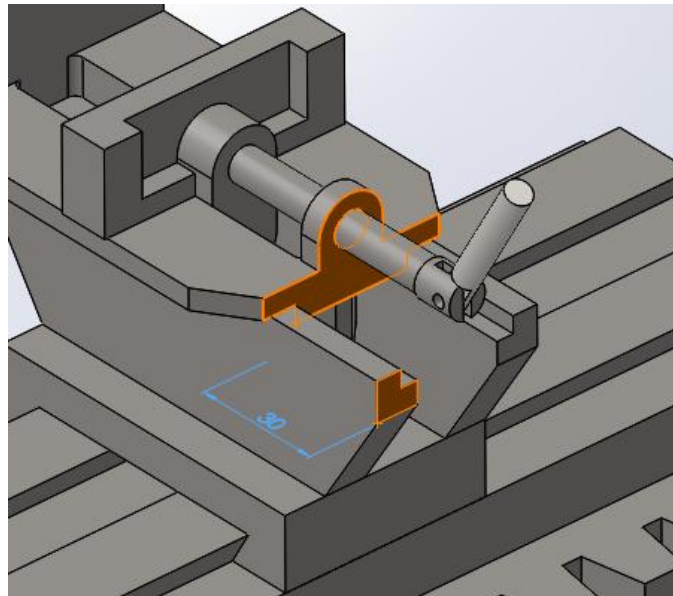


Figure 26 Modify the distance mates (15mm→30mm)  P4.2_Interference_No1.SLDASM

In an assembly that includes subassemblies, interference detection may be performed by considering the sub-assembly as one component. In this case, check the '**Treat subassembly as the components**' option. The figure below shows the collision site found through interference detection. The collision components are Part_2 and Part_3.

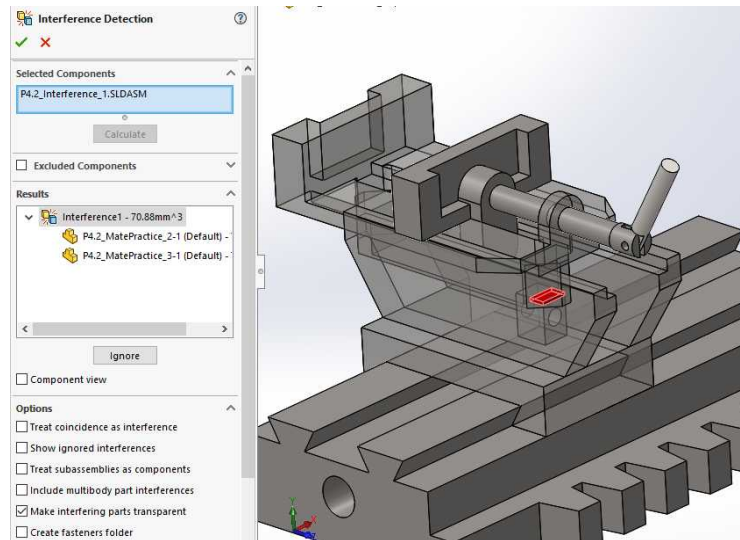


Figure 27 Calculated interference detection result

Collision detection is another tool available in the **Move component** property manager. You can turn on **Collision detection** in the option panel of the Move Component. There are several options available which are as shown below. The question form is to evaluate the distance or angle at the point of the collision while dragging a component with activating the '**stop at a collision**' option. The result of this type of problem can vary slightly each time since the measured value is calculated depending on the dragging style with the point of collision. Although some reasonable error (+/- 1%) is allowed, it is recommended that you measure it a couple of times to find the correct answer.

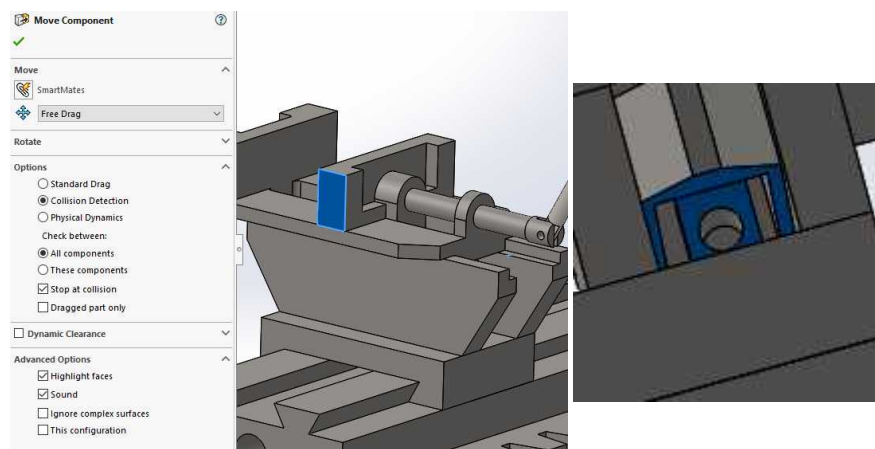


Figure 28 Collision detection setup and collided components

In fact, after performing this process several times, the distance was calculated with a slight error from 24.14 to 24.19. This error is caused by manually dragging.

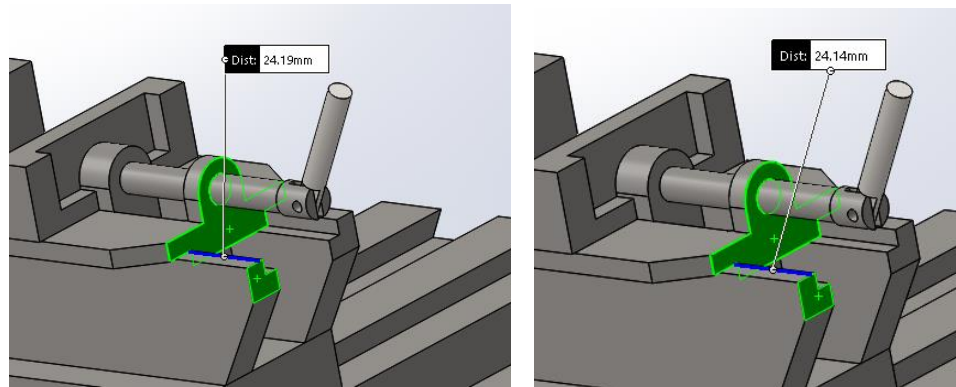


Figure 29 Calculated distance error in collision detection

There is one tip to remove this error. You can use it to remove mistakes in a real test. The collided components can be identified because these components will appear to be **Blue**, as shown below. Then, setting the appropriate mate to the identified part to fix the component's position. If you measure something in this state, it gives correct value without a slight error. In this case, we could identify that collided components are part_2 and part_3. Setting up a **Coincident** mate on the contacted surface or edge, it fixes the position and the measured distance will be the exact value, **24.19mm**.

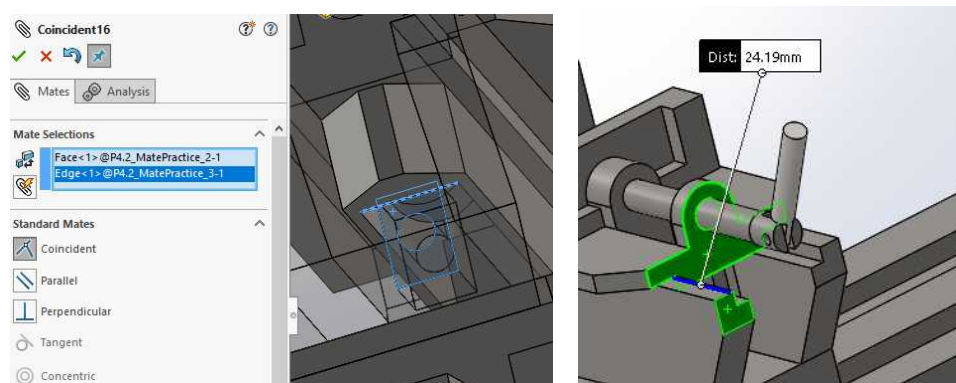


Figure 30 Create the corresponding mate on collided components

Hands-On Practice *Collision Detection #1***Practice**

- Practice time: 20 min
- Unit: MMGS (decimal digit 2)
- Instruction:
 - Assemble the provided components using the standard mate based on the images below.
 - Create a new coordinate system as shown and calculate the CG based on it.
 - With collision detection turned on (stop at collision 'ON'), rotate the arm as shown in the image until the arm stop at collision.
 - Measure the angle, X (degree), indicated in the image.
- Answer: 20.28 degree

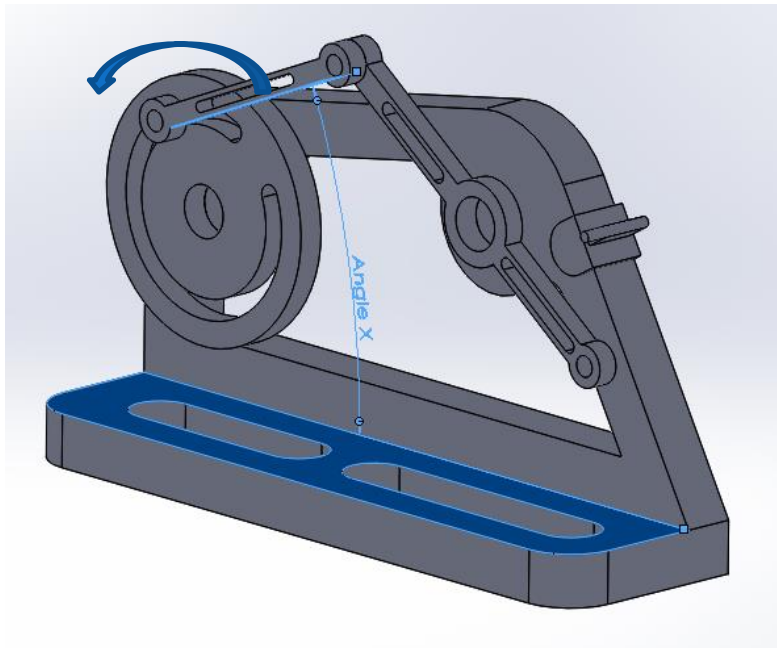


Figure 31 Collision Detection Practice  P4.2_Collision_No1.SLDASM

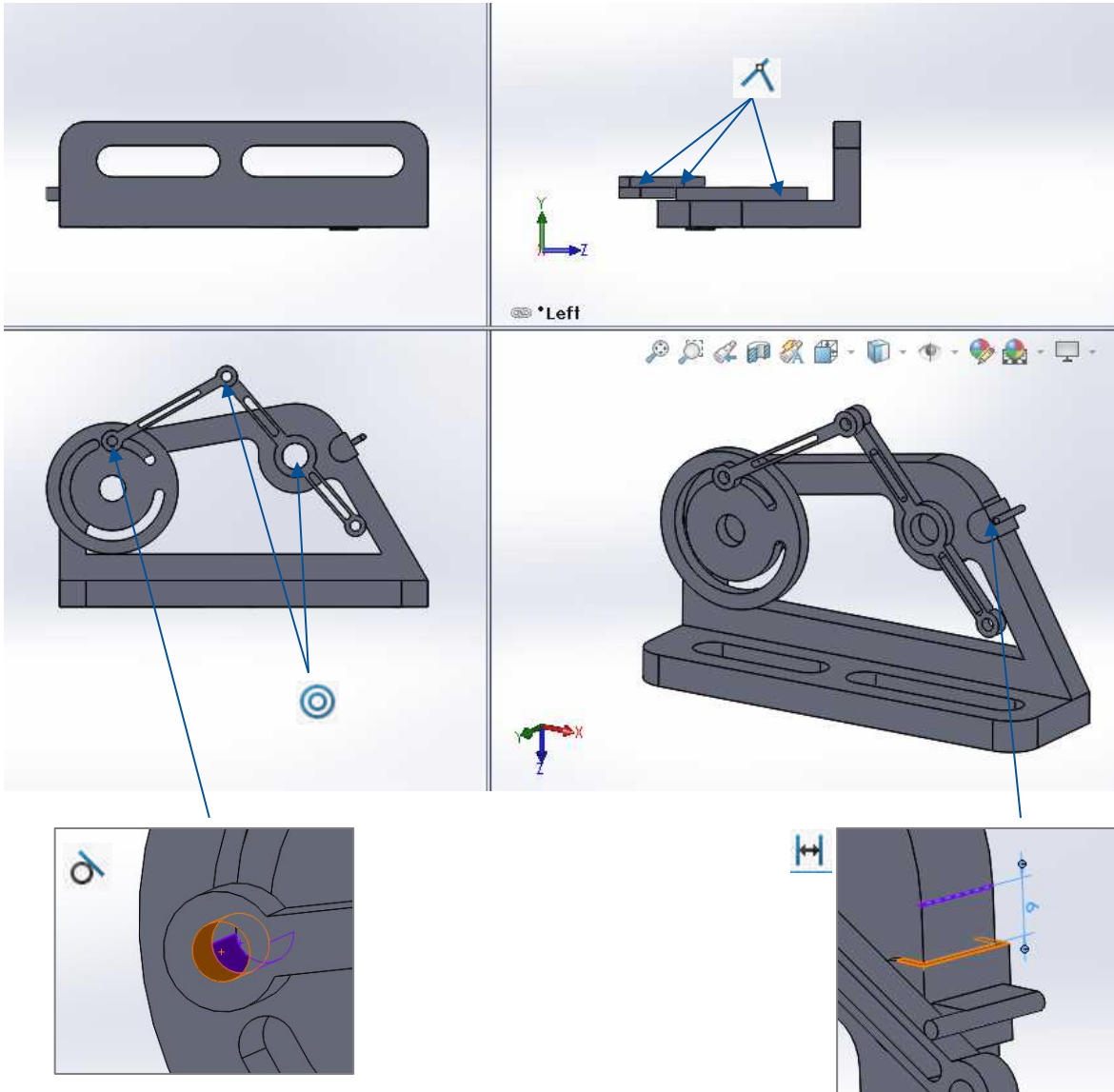


Figure 32 Assembly with mates

Common mistakes

Here are some common mistakes that can occur in Segment 3.

1. Mistakes when checking the status of Mate

At the moment of requesting the Center of mass in the question, all components must be fixed (mates should be fully defined). This is done by checking the symbol of the component condition in the design tree. There should be no sign (+) or (-) before the name of all components. All components that we created earlier should have a fixed (f) symbol in front of the component name. Make sure that there is no symbol in the rest of the components. Then, measure the center of mass.

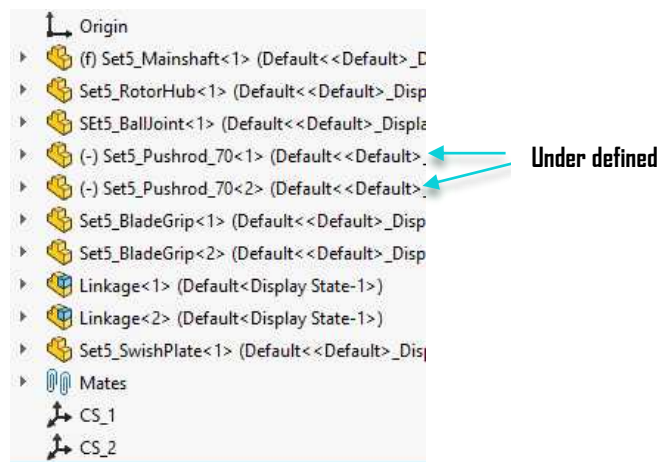


Figure 33 Example of Feature Manager Design Tree

2. Watch your coordinate system

In Segment 3, a couple of coordinate systems can be used in assembly to calculate the center of mass relative to these. No matter how well you use the mates to assemble, you always end up with zero point if you confuse the coordinate system.

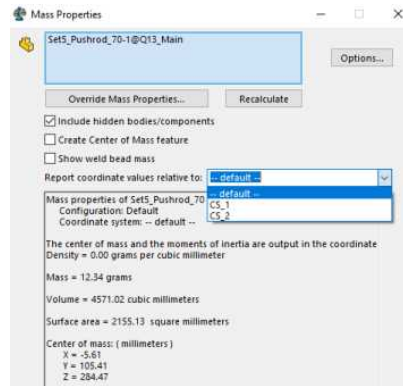


Figure 34 Selecting the correct coordinate system during the center of mass calculation

3. Make sure you know your mates.

Segment 3 of CSWP is all about advanced assemblies. To pass this section, you have to know standard mates as well as advanced mates. When selecting edges, surfaces, etc. to set the Mate, SOLIDWORKS sometimes selects a mate automatically for the selected object. In particular, when you pick two surfaces of cylinder SOLIDWORKS sometimes confused with concentric and tangent mates. So, it is necessary to have the ability to immediately recognize the exact mate provided by the information in question through a symbol. In segment 3, there will be a large number of mates used.

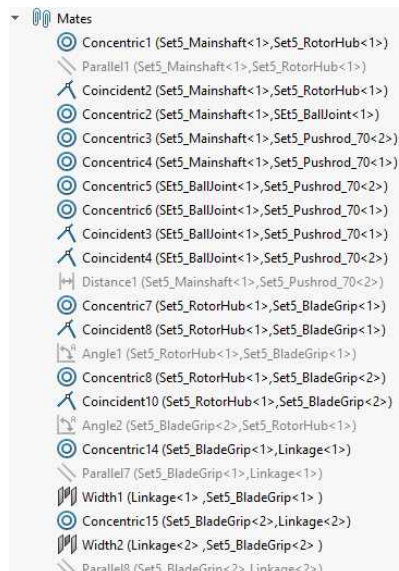


Figure 35 large number of mates used in segment 3 (example)

4. Rebuilding error

In some cases, downloaded models could have many warnings and errors during the rebuilding. In this case, if many yellow warnings and red errors occur, it can be psychologically embarrassing. At this time, do not panic, check the design tree one by one to catch conflicted mates as soon as possible. There are two ways to check the mate in the design tree: the assembly folder having entire mates and individual component folder having the mates of each component. An effective way to fix errors would check the mates of individual components one-by-one rather than complicated assembly mates.

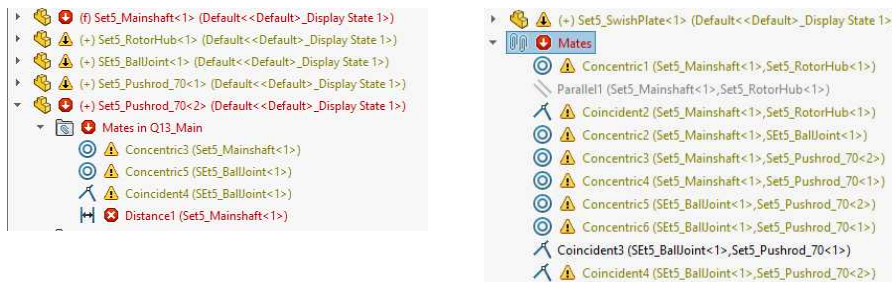


Figure 36 Individual component mates vs. assembly mates

5. Treat Subassembly as Rigid / Flexible

There is often some confusion about this concept of Rigid/Flexible subassembly. Rigid / Flexible can be selected simply by RMB on the subassembly in the design tree. In some cases, instructions are often given to handle subassembly as rigid or flexible. The users need to know how to make a subassembly flexible on this one. If the subassembly icon is integrated, it is rigid, and if the subassembly icon is separated, then it is flexible. If the mate is fully defined, the subassembly will not move even if it is defined as flexible. Only when underdefined individual components of the subassembly can move when set to flexible in the main assembly.

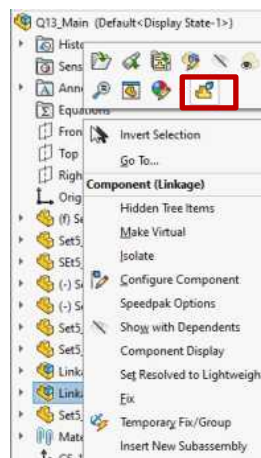


Figure 37 Define subassembly as rigid/flexible

4.3 Walkthrough: Practice Exam Set 1

In this section, you will walkthrough the sample exam which has an almost identical format of the actual exam. The sample exam document was presented from the next page. Readers can test the exam before check the solution provided after the sample exam document.

In this segment, you will be tested to follow skills:

- Creating a simple component and sub-assembly
- Download parts and assemble components and a sub-assembly into an assembly
- Insert various mates such as Width, Angle, Parallel, Distance.
- Calculating interference detection and measure distances and angles.
- Modify coordinates and replace components in the assembly
- Measuring the center of gravity based on the coordinates and total mass of the assembly.

There are many ways to find the answer to the following questions. The most important goal is the ability to accurately recognize design intents and use SolidWorks appropriately. Before starting the exam, create a working folder to save your working models and prepare simple note-taking tools to write how to find a solution. Writing down in a notebook can accomplish your goals clearly and speedily rather than just thinking in your mind.

The first question in this segment is instructional questions as shown below:

CSWPR4 Segment 3: Examination Information

Examination Information

Welcome to Segment 3 of the CSWP Core Exam

- This test is made up of a series of problems broken down into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set.
- You must use at least SolidWorks 2008 for this exam. Any use of a previous version will result in the inability to open some of the testing files.
- Your exam is: 13 questions.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have 80 minutes to complete this examination.
- Minimum passing score is: 140 points.
- Your proctor is: 000 000

Press the Start Examination button to continue.

Start Examination

Question 1 of 13

For 0 point:

Part Configuration Problem Set Description

This text describes the problem that must be solved in this problem set.

You will be creating an assembly of a robotic arm starting with the base. Some parts will be modeled by you and others will be supplied to you.

You will be asked to do the following:

- Modeling of individual parts correctly
- Assembling and mating parts into assembly
- Interference detection
- Mate modification
- Part replacement

Note: The images shown are not to scale due to differences in the parts being downloaded for each tester.

Please select **Yes** and **Continue** to the next question.

Yes

Continue

Question 2 of 13

For 20 points:

Create Base Part

Build this part in SolidWorks.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Aluminum Alloy

Density: 0.0027g/mm³

All holes through all unless shown otherwise.

A=120mm

B=20mm

C=145mm

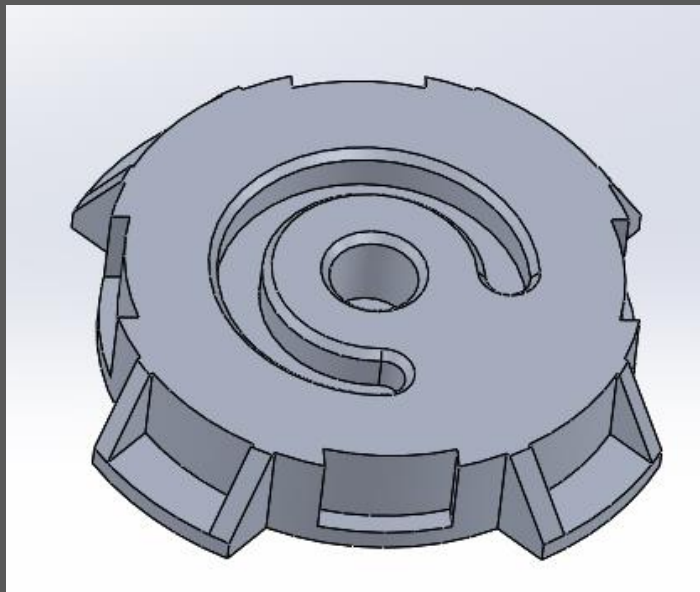
What is the overall mass of the part (grams)?

☐ 713.83

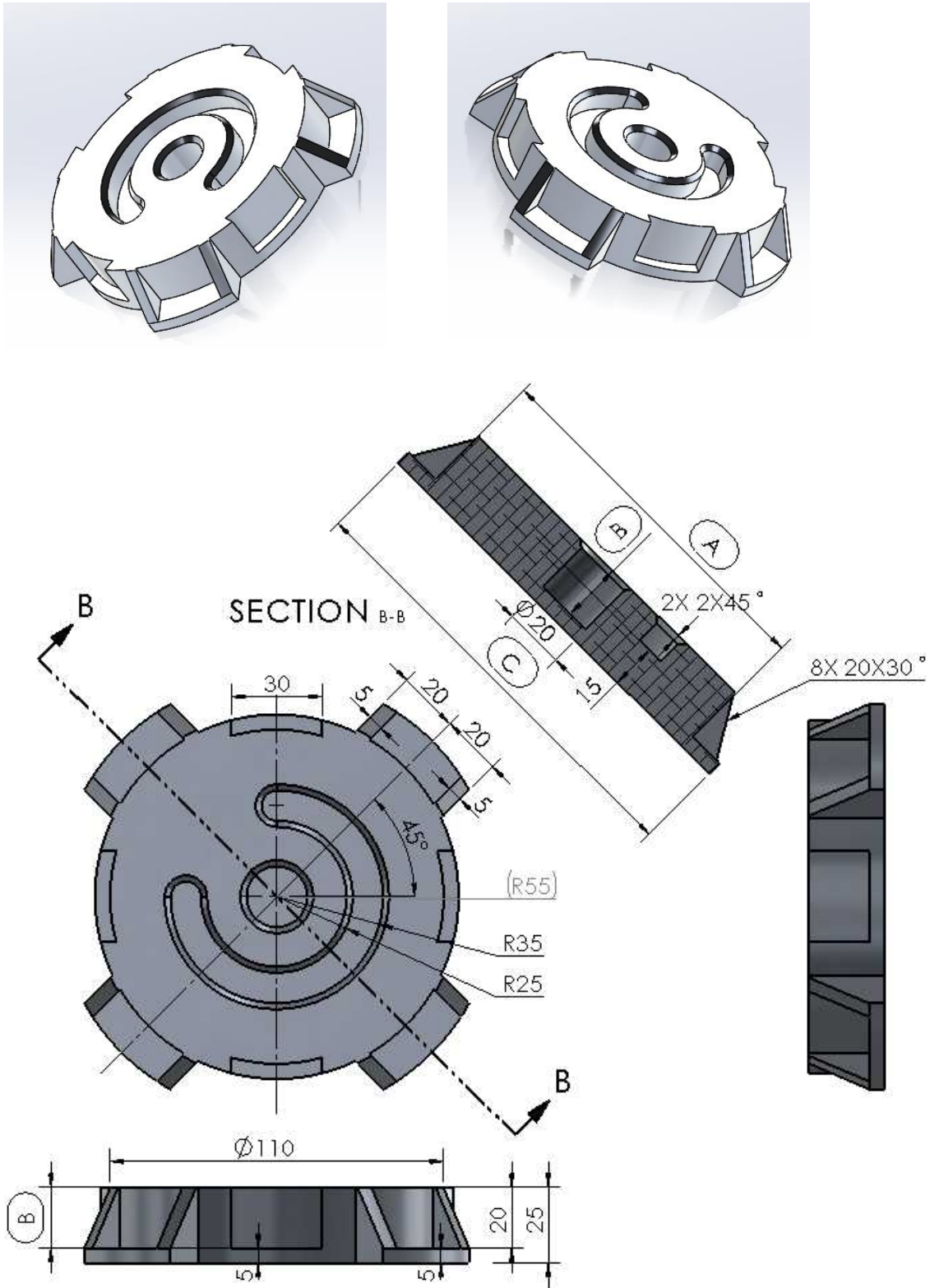
☐ 721.35

☐ 709.33

☐ 714.56



Reference Image for Q2 in Segment 3 >>



Question 3 of 13

For 10 points:

Create Assembly from the Base

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Insert the base created in the last problem into an assembly

Note: this assembly will be referred to as the main assembly

-Create a coordinate system at the location and orientation shown in the first image.

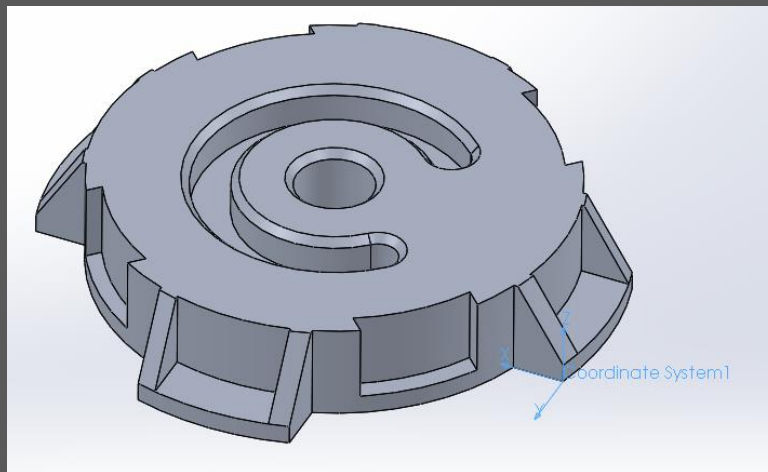
Note: This coordinate system will be used throughout the problem set

-Using the create coordinate system as the output coordinate system, measure the center of gravity of the assembly

What is the center of gravity of the assembly (mm)?

Enter Value: |X= | Y= | Z= |

(Use . (point) as decimal separator)



Question 4 of 13

For 15 points:

Add the top mount to assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

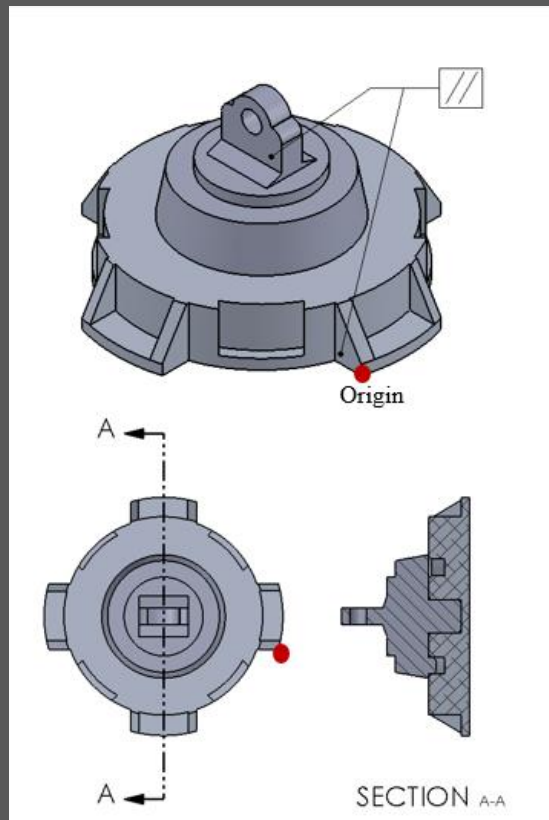
- Open the attached part '**Top Mount**'
- Insert the top mount into the assembly that contains the base.
- Position the top mount with respect to the base as shown. Create all the necessary mates.
- Using the coordinate system created earlier as the output coordinate system.

Measure the center of gravity of the assembly.

What is the center of gravity of the assembly (mm)?

Enter Value: X= Y= Z=

(Use . (point) as decimal separator)



Question 5 of 13

For 20 points:

Rotate top mount and collision detection

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

With collision detection turned on, Rotate the top mount as shown in the image until the top mount stopper pin is contacted by the base guide slot.

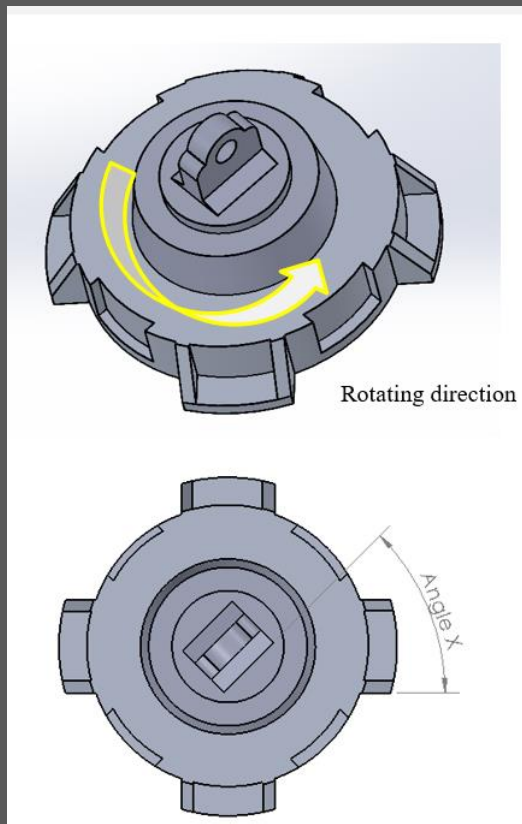
Note: Modify or delete any previously placed mates if necessary

Measure the angle, **X**, indicated in the image. (Between 90~180 degree)

What's the measured angle, **X** (degree)?

Enter Value:

(Use . (point) as decimal separator)



Question 6 of 13

For 10 points:

Creating Robotic Arm Assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Material: 1060 Alloy Aluminum

Density: 0.0027g/mm³

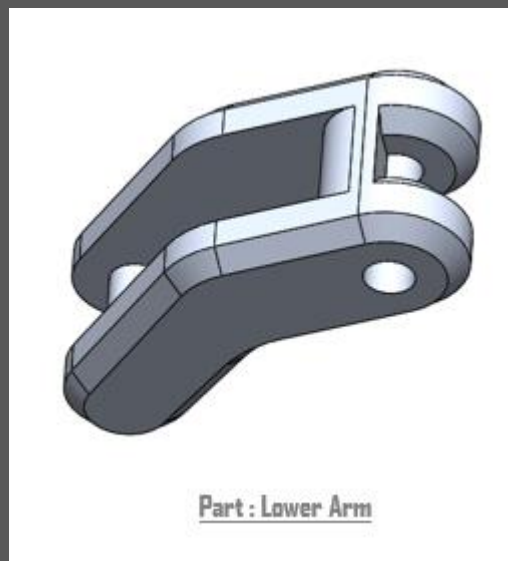
- Open the attached part '**Lower Arm**' and create assembly.
- * Note: This assembly will be referred to as the **Robotic Arm** Assembly.
- Save the assembly.

Measure the mass of the Robotic Arm Assembly.

What's the overall mass of the assembly (grams)?

Enter Value:

(Use . (point) as decimal separator)



Question 7 of 13

For 10 points:

Assembly Robotic Arm

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Open the attached part 'Lower Arm'

Note: This assembly will be referred to as the Robotic Arm Assembly.

- Insert the **Rotating Adapter** and **Rotating Arm** into the assembly and mate them as shown in image.

- Create all the necessary mates.

*Note: Pins and holes should be mated concentrically as shown but should be free to slide and rotate.

*Note: Make and position the parts and make sure to set the proper faces and edges parallel as indicated in the images

Measure the mass of the Robotic Arm Assembly.

What's the overall mass of the assembly (grams)?

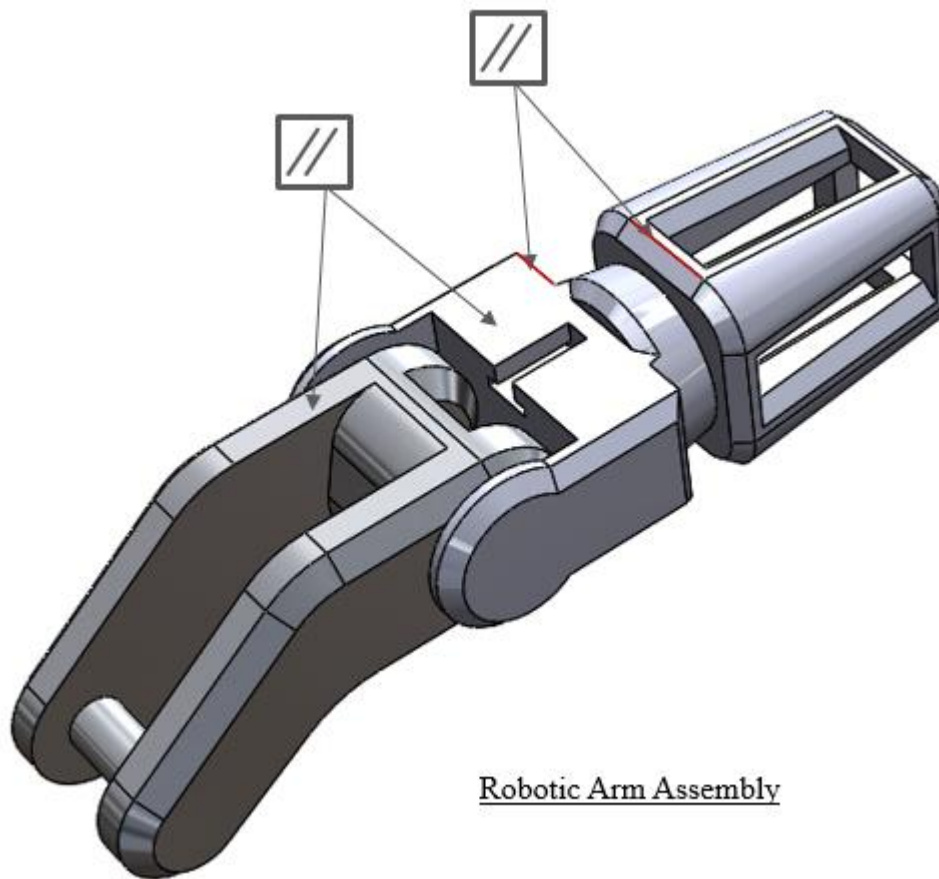
☐ 331.81

☐ 332.00

☐ 330.03

☐ 333.33

Reference Image for Q7 in Segment 3 >>



Robotic Arm Assembly

Question 8 of 13

For 20 points:

Add the Robotic Arm Assembly to the main assembly.

Unit system: MMGS (millimeter, gram, sec)

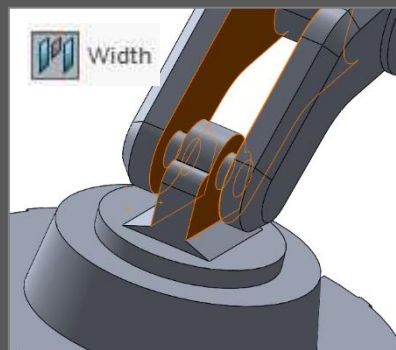
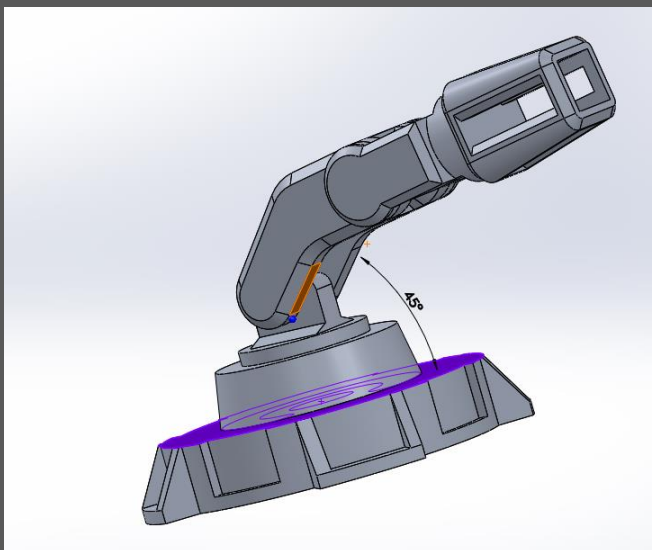
Decimal places: 2

- Insert Robotic arm assembly into the main assembly.
 - * Note: Keep main assembly state in question #5.
 - Make the Robotic Arm Assembly free to rotate with respect to top mount hole.
 - Use a Width mate to properly position the Robotic Arm Assembly in main assembly.
 - Add Angle mate (45 degree) as shown in image between two surfaces of lower arm and base parts.
 - Using the created coordinate system as the output coordinate system.
- Measure the center of gravity of the main assembly.

What's the center of gravity of the main assembly(mm)?

Enter Value: |X= Y= Z= |

(Use . (point) as decimal separator)



Question 9 of 13

For 15 points:

Insert '**stopper**' part into the assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Open the attached part '**stopper**' and add it to the main assembly.
- Mate and position the stopper (5mm distance) as indicated in the image
- Using the created coordinate system as the output coordinate system.

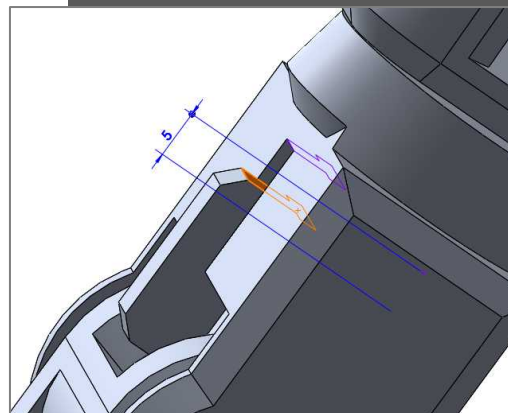
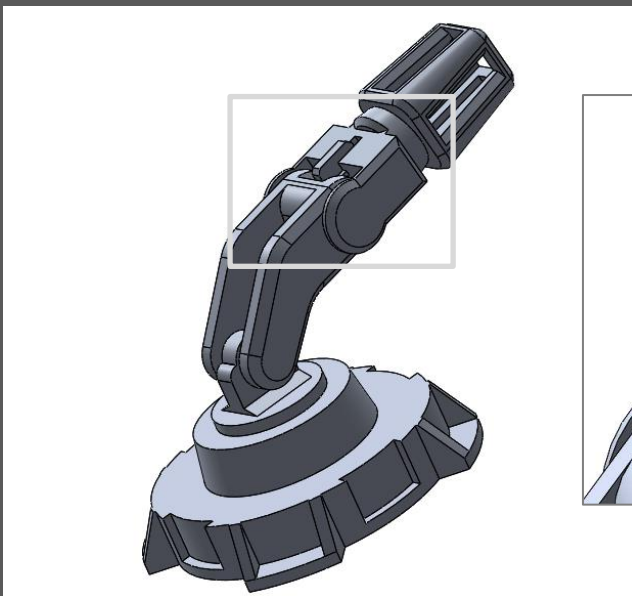
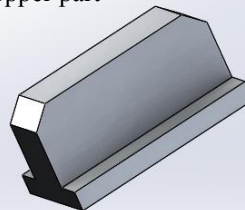
Measure the center of gravity of the main assembly.

What's the center of gravity of the main assembly?

Enter Value: X= Y= Z= |

(Use . (point) as decimal separator)

Stopper part



Question 10 of 13

For 15 points:

Add subassembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Open the attached part '**End Probe**' and '**End Pin**'. Add them to the main assembly.
- Mate and position them following the orientation and distance shown in the images while maintaining the positions of the other components.

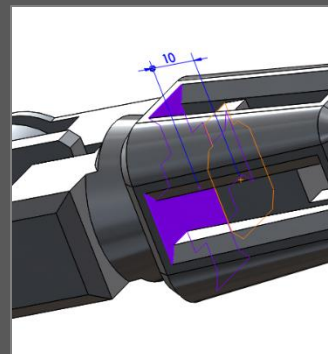
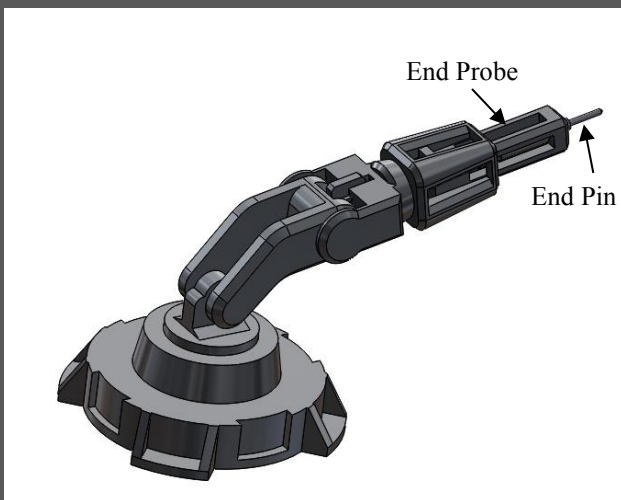
*Note: Maintain the same mates of the rest of the components as previously assigned unless changes are described.

- Use a distance mate to position the '**End probe**' and '**End pin**' on the exact position.
- Measure the total mass of the main assembly?

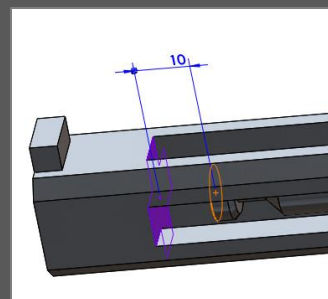
What is the total mass of the main assembly (grams)?

Enter Value:

(Use . (point) as decimal separator)



Distance mate 1



Distance mate 2

Question 11 of 13

For 20 points:

Insert probe parts into the assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Material of the End grip: 1060 Alloy Aluminum

Density: 0.0027g/mm³

Part origin: Arbitrary

- Create the part '**End grip**' based on the provided drawing.
- Assign the material 1060 Aluminum alloy to the part
- Replace it with '**End pin**' and mate it following the orientation and position shown in the image.
- Position and mate the rest of the assembly following the orientation shown in the images.
- * Note: Remove and modify the previous mates to comply with the new orientation and mates shown here. Some mates in subassembly might need to be modified.
- Using the created coordinate system as the output coordinate system, measure the Center of Gravity of the assembly.

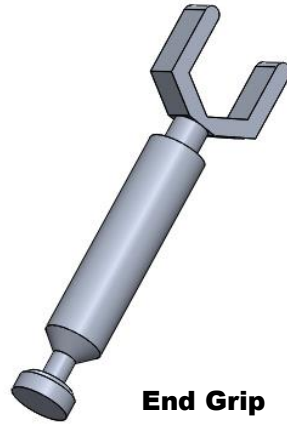
What is the center of gravity of the assembly (mm)?

Enter Value: |X= Y= Z= |

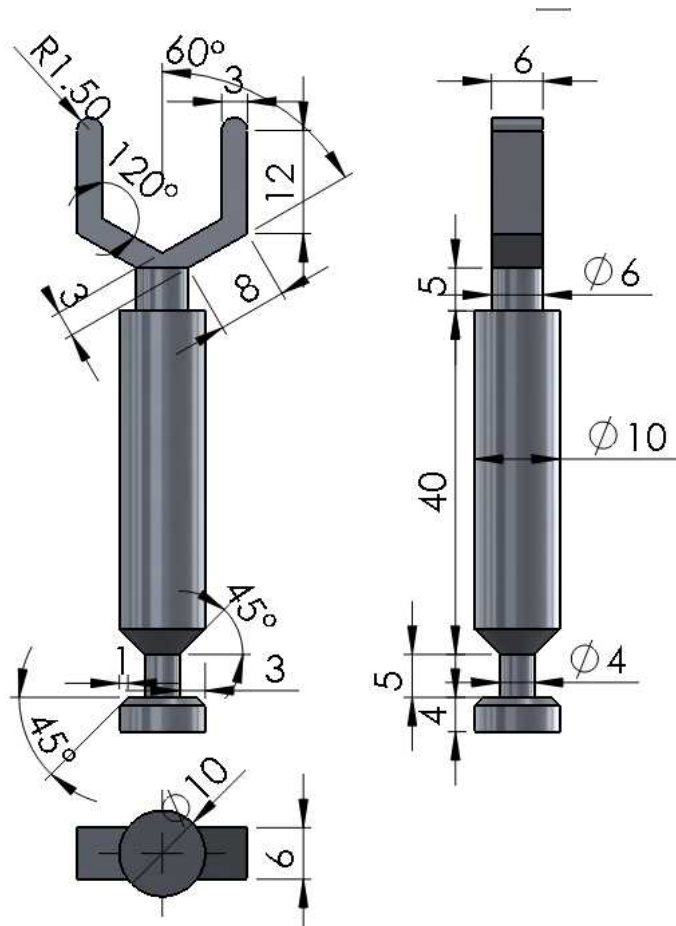
(Use . (point) as decimal separator)



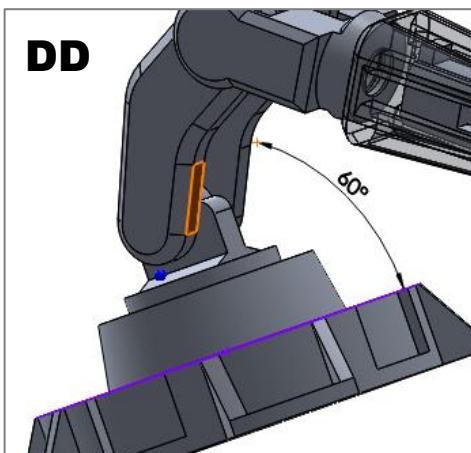
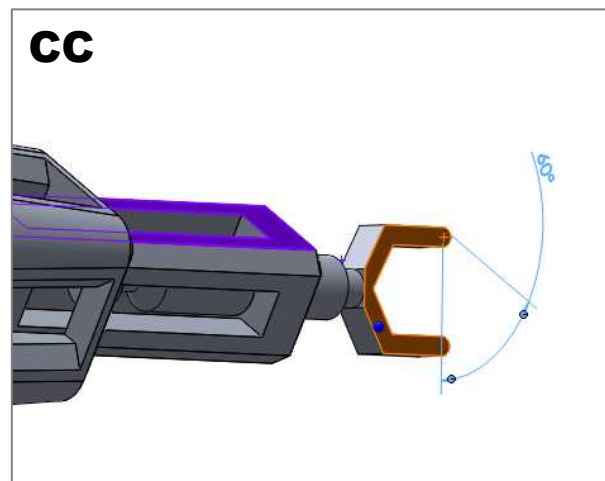
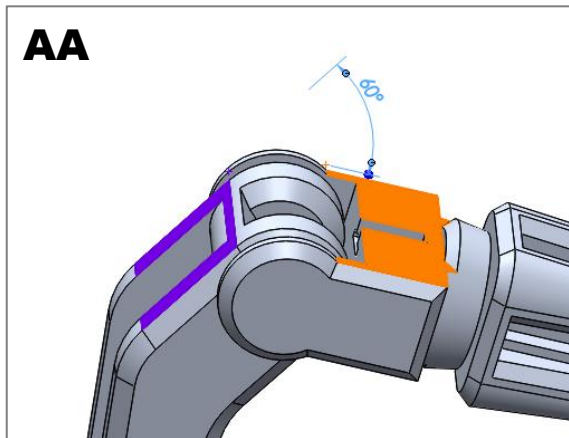
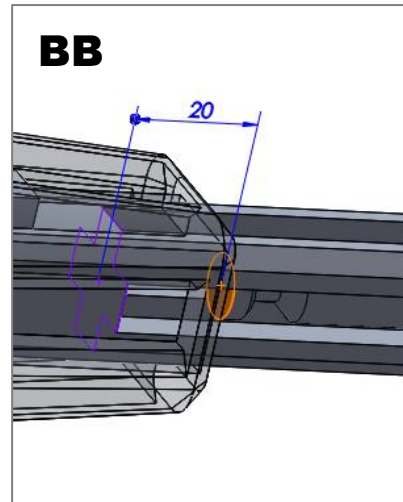
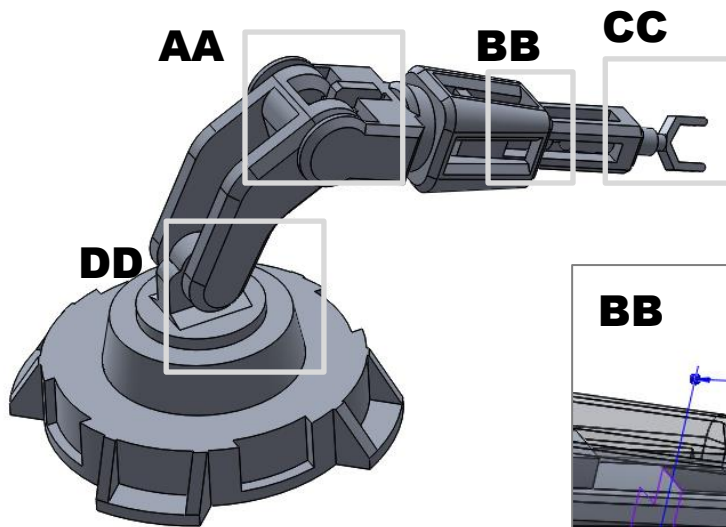
Reference Image for Q11 in Segment 3 >>



End Grip



Reference Image for Q11 in Segment 3 >>



Question 12 of 13

For 15 points:

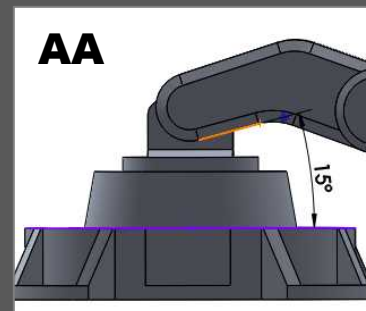
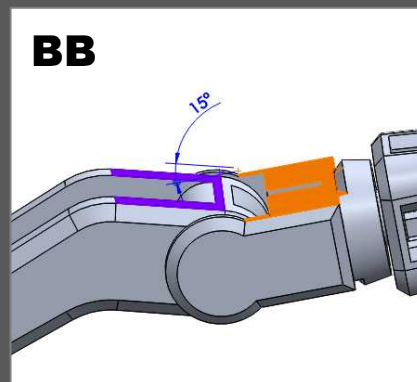
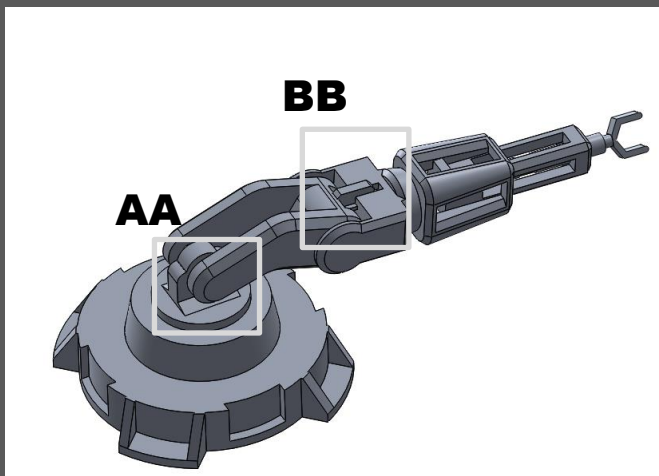
Interference Checking in the main assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Change the parameters of the mates as shown in the images
- Perform an Interference Detection check on the main assembly while turning on the following options
 - Treat subassembly as components
 - Make interference parts transparent
- * Note: All other interference detection options will be unchecked (OFF)

Select all the components that are found to cause interferences or No interferences detected if no interference are found

List components causing interference: 

Question 13 of 13

For 20 points:

Update parameters of Base and find position without collision

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Update the base part with described linked values.

A=118mm

B=20mm

C=155mm

- Modify the mates as shown below images. Maintain the same mates of the rest of the components as previously directed.

*Note: Delete the angle mate of the 'Rotating Adapter' to be free in rotation.

- Set the subassembly as '**Flexible**'

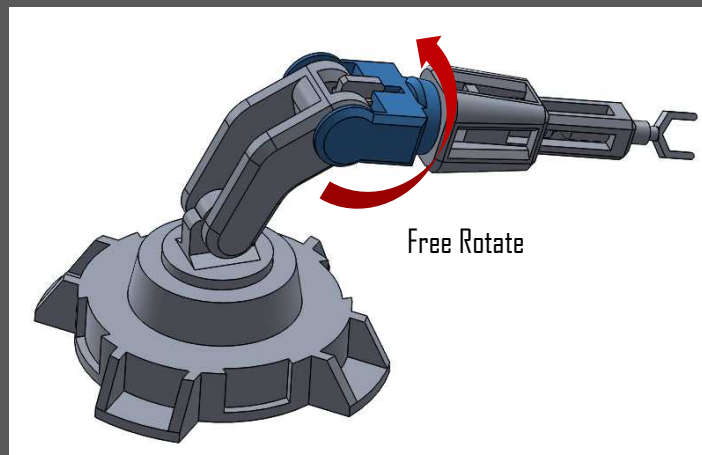
- With collision detection on, rotate the '**Rotating Adapter**' as shown images and keep the position at collision.

- Create a new coordinate system in the position and orientation shown in the image. Using this coordinate system, measure the center of the gravity of the assembly.

What is the center of gravity of the assembly(mm)?

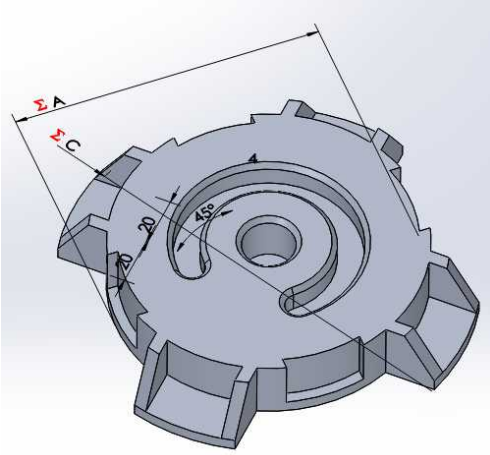
Enter Value: |X= Y= Z= |

(Use . (point) as decimal separator)



Reference Image for Q13 of Exam Set 1 >>

Linked value update in 'Base'

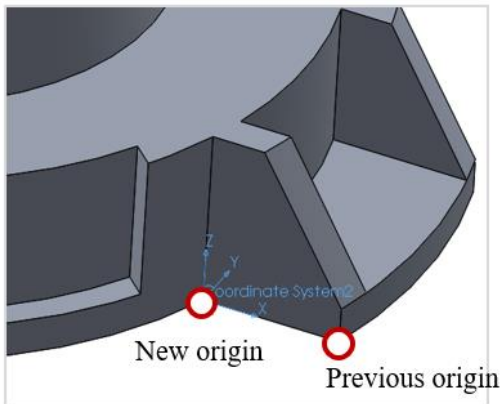


A=118mm

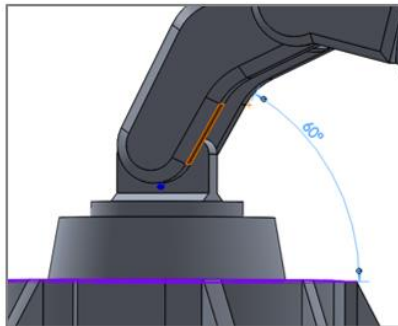
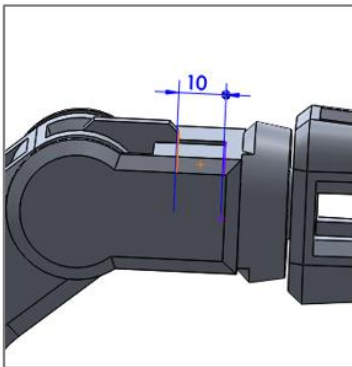
B=20mm

C=155mm

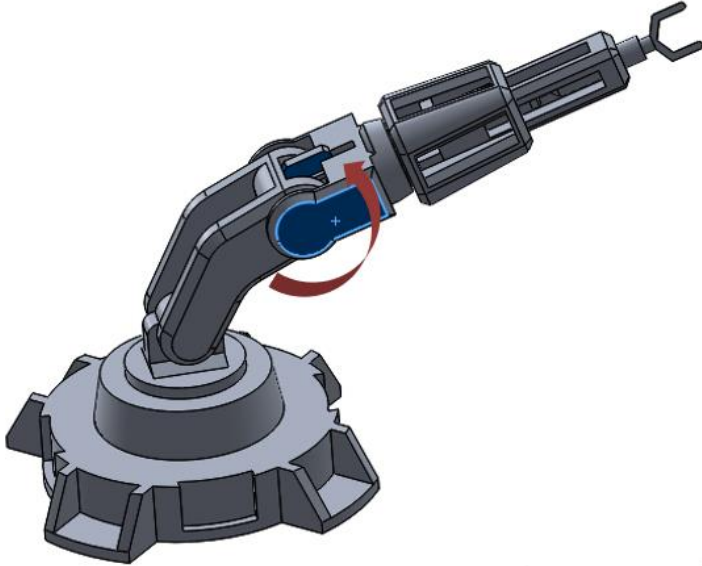
New coordinate system



Mates modification



■ Rotate the part 'Rotating Adapter' till Collision occurs, then measure the C.G.



Answer Sheet

EXAM SET 1

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information		-
2	Create a part	20	☐ 713.83
3	Create assembly	10	X=69.25, Y=-20.00, Z=11.48
4	Add part to assembly	15	X=69.38, Y=-19.97, Z=18.42
5	Collision detection	20	135.00
6	Add part to assembly	10	149.00
7	Create assembly	10	330.03
8	Add sub-assembly	20	X=57.33, Y=-31.94, Z=38.62
9	Insert a part	15	X=57.23, Y=-32.04, Z=38.79
10	Create a part and replace	15	1379.84
11	Insert probe parts	20	X=55.89, Y=-33.31, Z=38.27
12	Interference checking	15	Stopper, lower arm
13	Find specific position	20	X=-40.97, Y=34.06, Z=46.25
	Total	190	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

- What's your score?
- Do you finish segment 3 test within 80 minutes? ☐ Yes ☐ No
- Do you pass segment 3 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating sub-assembly
 - ☐ Creating Mates
 - ☐ Moving Parts
 - ☐ Creating Coordinate
 - ☐ Modifying Advanced Mates
 - ☐ Part Creation

E N D o f E X A M S E T N o . 1

SEGMENT 3 WALKTHROUGH

ASSEMBLIES

CSWP segment 3: Assemblies

This section of the CSWP exam explores your ability to create assemblies. In this segment, there will be little modeling than the previous segment. This segment more focuses mainly on assemblies, adding components, positioning them with mates, replace them, and handling the coordinate system. The key ability of this segment is that the user has the capability of adding and placing components and also be able to locate them correctly so that rebuilds will be quick and easy and avoid wasting time.

This section describes the step-by-step walkthrough solution for the practice exam set #1 for Segment 3. There are many ways to solve the questions, and you could find more effective and faster methods than the provided one here by practicing this exam. There are four additional hands-on exams given later in this chapter, so try to find the best way to solve the problem in a variety of ways, master your skills, and hope to pass the exam at a single attempt.

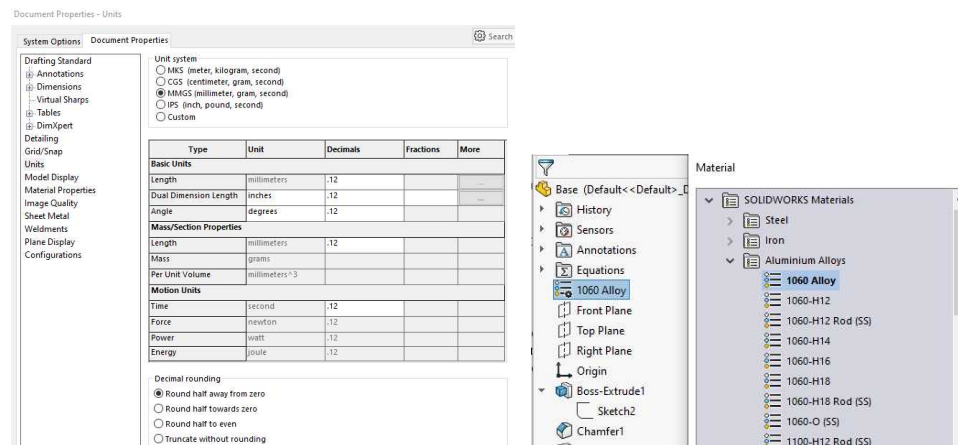
Question #2 Work Process

The second question is to build a part for the assembly based on the provided drawing. It is almost like a CSWP segment #1 exam. Good thing is that it's simpler and more straightforward than segment #1 modeling.

The first step is to set up a work environment properly based on the provided information and unit system.

Unit system: MMGS (millimeter, gram, sec)
 Decimal places: 2
 Part Origin: Arbitrary
 Material: 1060 Aluminum Alloy
 Density: 0.0027g/mm³

Firstly, set up a unit with a decimal point as described above. **Tools**→**Option**→**document properties**→ select **MMGS** with 0.XX decimal points (see image).



Unit and material options

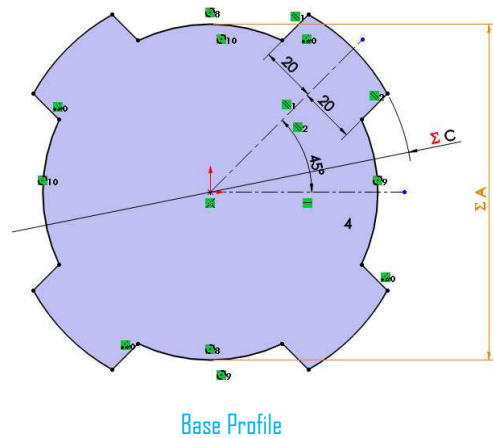
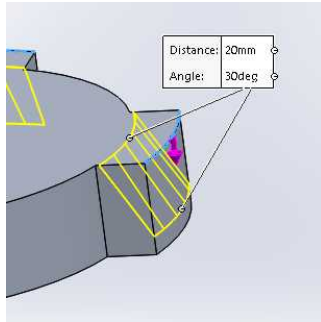
Then, select **Edit material** on the left side model tree, the right mouse button will open the material option. Select **1060 Alloy** as described and confirm the density of the material is 2700kg/m³ (0.0027g/mm³).

Before start modeling, setup the **Global variables** in Equation as described in the problem statement. A=120mm, B=20mm, C=145mm

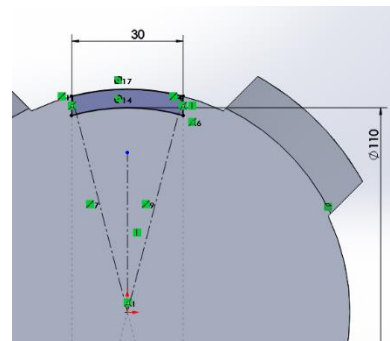
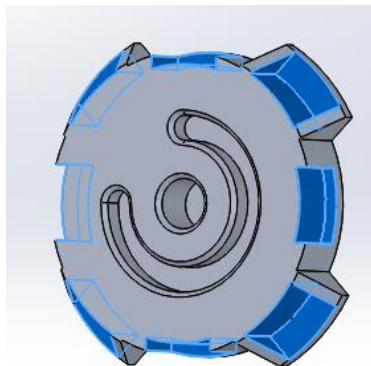
Equations, Global Variables, and Dimensions

Name	Value / Equation	Evaluates to
Global Variables		
"A"	= 120	120
"B"	= 20	20
"C"	= 145	145
Add global variable		

- The next step is to create a base part based on the provided illustration. Create a bottom profile of the base part. Then, extrude 25mm.
- Create chamfer 30 degrees with a 20mm distance as shown below.

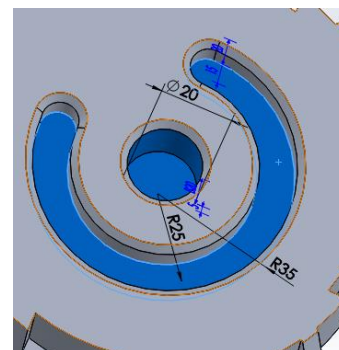


- Create cut-extrude profiles and make cut-extrusion for two locations.



- Create cut-extrude profiles for a center hole and circular slit as shown below. Be careful with the geometry of a circular profile. Then create chamfer on the top edges of the hole and slit. That's all for this part.

There are several ways to create this part. Generally, it takes 7~8 features. A tester should be modeled within at least 8~10 min. This first part will be used for the following questions. So, make sure you have done correctly. The answer form is multiple choices. So, you could check the answer indirectly.



Slot profile

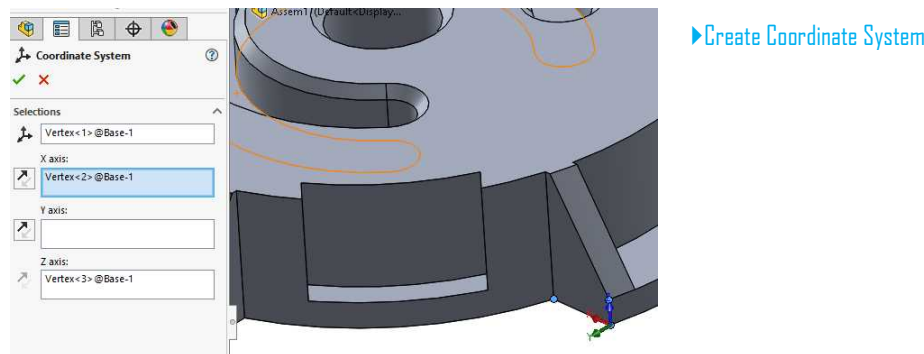
Finally, measure the mass of the part. If you did correctly, the exact number of mass should be shown in the answers. If not, you need to recheck the modeling process. The correct answer is **713.83** grams. Save the model file and name it as '**Base.SLDPRT**'

Question #3 Work Process

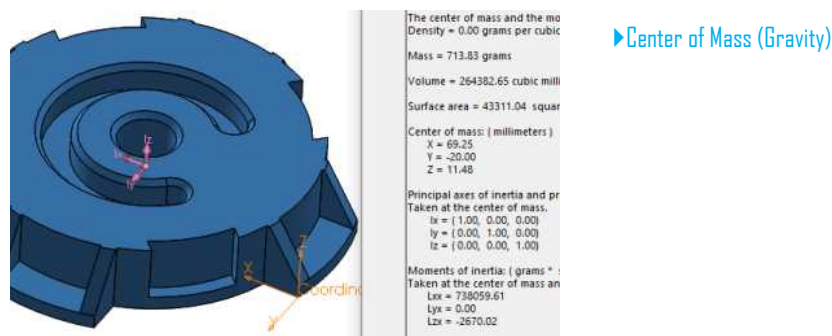
Next question is to create assembly using the existing part created in question #2. Then, set a new coordinate system based on the problem information. Measure the Center of Gravity relative to the created coordinate system. You need to practice setting a coordinate system and measuring the C.G using the created coordinate system. This question is one of the simple questions in segment 3. It is desired to answer this within a couple of minutes.

Create an assembly from the Base component which is automatically fixed to the origin.

Create a new coordinate system based on the provided information. Select **Reference geometry** → **Coordinate system** on assembly top menu. Then, select origin, X-axis, and Z-axis as shown in the image below.

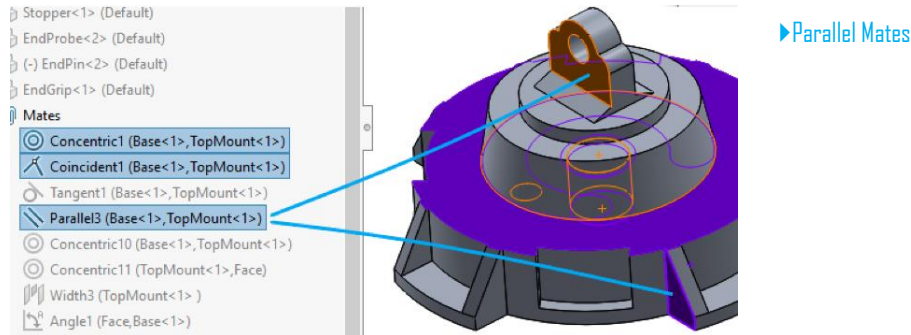


Measure the center of gravity relative to the new coordinate system, **Coordinate system-1**. You have to select the created coordinate system in the mass property dialogue box. The measured CG is **X=69.25, Y=-20.00, Z=11.48**. Save the assembly file.



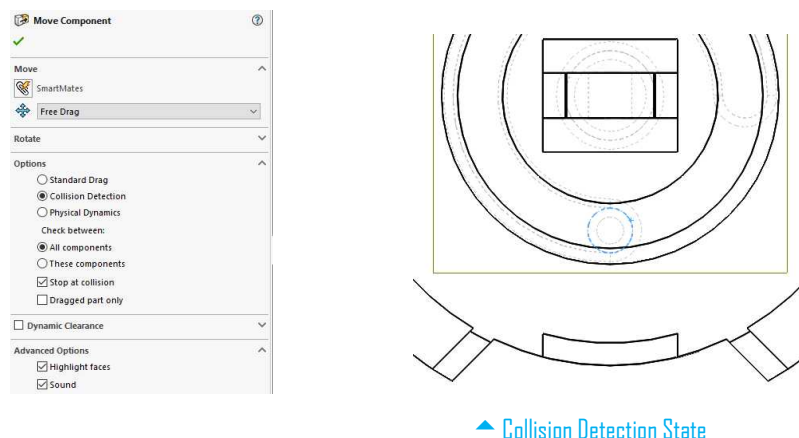
Question #4 Work Process

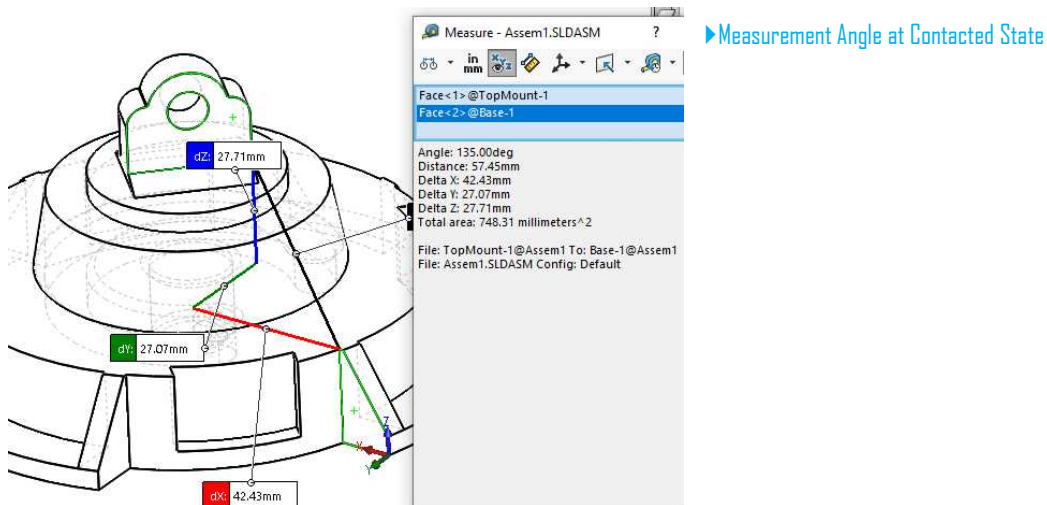
Question #4 is just adding a component and placing it in the correct position. Open the part file '**Top mount**' and insert it to the existing assembly model. Locate it at top of the **Base** part. There are three mates (concentric, coincident, and parallel) required to position it correctly. Then, measure the CG in mm relative to the created coordinate system. Be careful about selecting the correct coordinate system when measuring CG. The measure CG is **X = 69.38, Y = -19.97, and Z = 18.42**. It should not be a difficult task.



Question #5 Work Process

This question requires basic knowledge of collision detection and measure tool. Select **Move component** from the Assembly menu, check **Collision detection** in options, and check **All components** and **Stop at collision**. After suppressing the parallel mate created earlier, drag the top mount to rotate it counterclockwise. When rotating, a collision occurs when the pin on the bottom of the top mount contacts the inner surface of a slot in the Base and stop as it is. In this state, measure the angle between one side of the top mount and the side of the base support based on the provided information. The measured angle is **135.00** degrees. This process results in a slight error in every measurement, so a 1% off-values of a measured angle is acceptable.





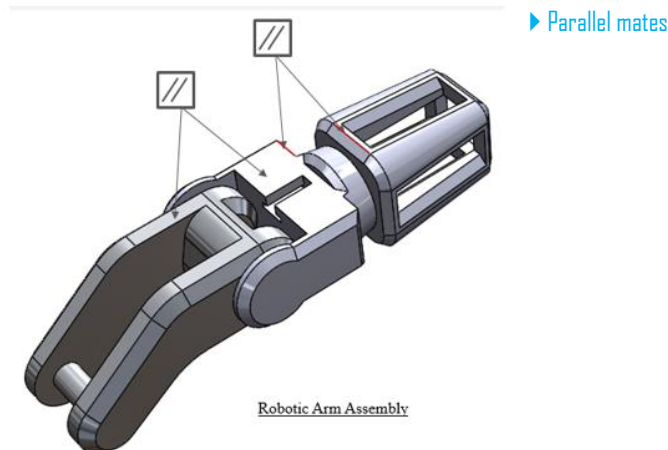
Here is a tip. Once the faces that are in the collision has been identified, there is a method of fixing the state by setting an appropriate mate in the area. By applying this method, it is possible to measure the angle in the correctly contacted state.

Question #6 Work Process

This is a very simple question. Open the **Lower Arm** part and create a new assembly. Then measure the mass. By adding parts to this assembly, it is considered as a **sub-assembly** and add it to the main assembly that includes the **Base** part, which will be used for later problems. The mass of the Lower Arm is **149.00** grams.

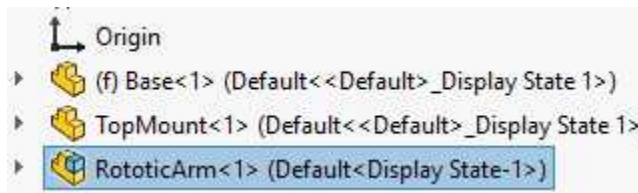
Question #7 Work Process

Add the **Rotating Adapter** and **Rotating Arm** to the assembly created in the previous problem. Create the appropriate mate as shown below. The mates used here are **parallel**, **coincident** and **concentric** mates. The total mass of this assembly is **330.03 grams**

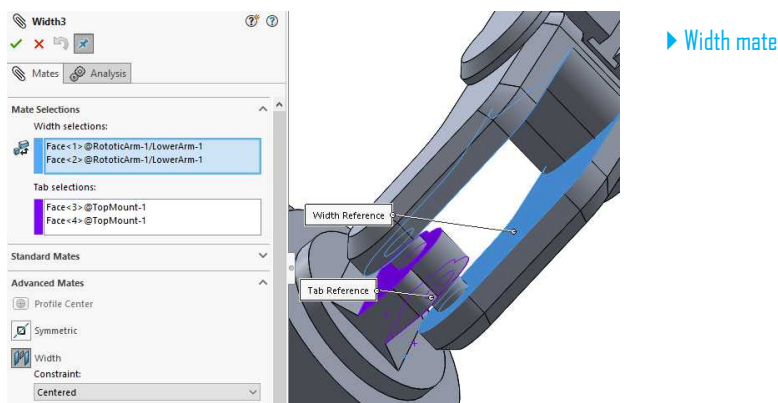


Question #8 Work Process

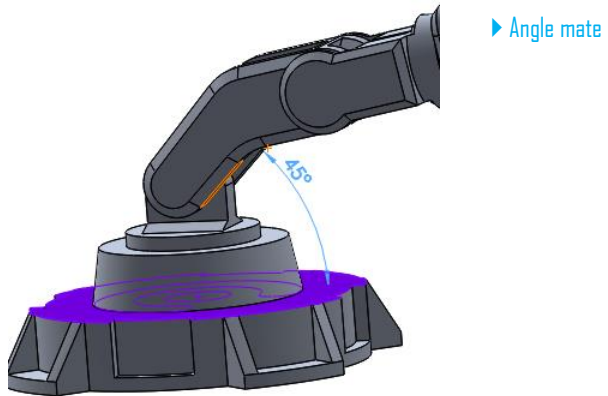
Insert the **Robotic arm** assembly into the **main assembly** containing the Base part. The robotic arm assembly acts as a sub-assembly and has the assembly in the model tree is as shown below. **Base** and **Top Mount** of the main assembly must maintain the state of problem #5, so set the appropriate mate to be in a collision state.



Apply the **Width** mate between the robotic arm assembly and the top mount hole as shown below. The Width mate isn't the basic mate you usually use, but it's a common mate in segment 3, so you need to learn how to use it properly.

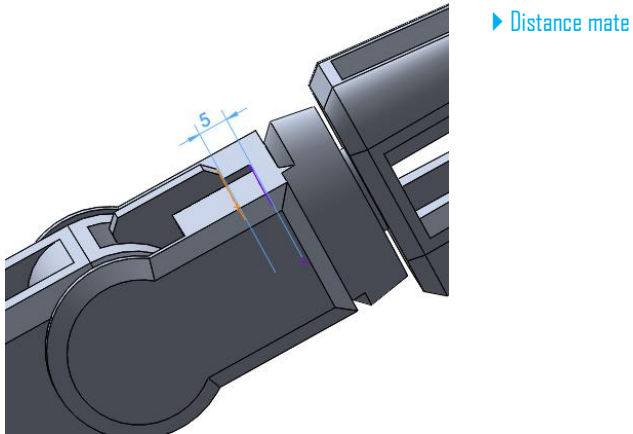


Finally, set the angle of **45 degrees** between the sub-assembly and the top mount/base using the **Angle mate** as shown below. Then, if CG is measured based on previously generated coordinates, $X = 57.33$, $Y = -31.94$, and $Z = 38.62$.



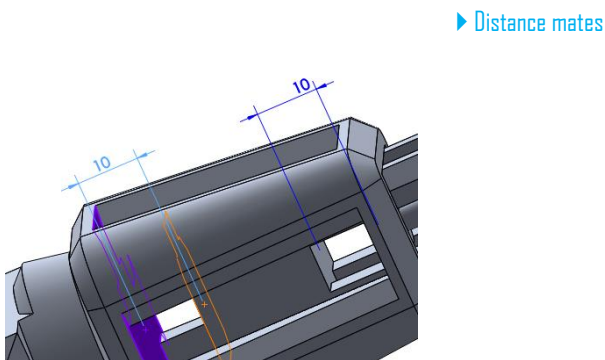
Question #9 Work Process

Unless otherwise instructed, keep the assembly of the previous question and insert a **Stopper** into the main assembly. Using the **Distance** mate, set **5mm** as shown below. Then, measure CG, the answer is **X = 57.23, Y = -32.04, and Z = 38.79**.



Question #10 Work Process

Insert the **End Pin** and **End Probe** into the main assembly. Locate them using distance mates as shown in the figure below. Now, measure the mass. In fact, the mated state in the assembly and mass of the assembly will not be correlated, but the current assembly state that is used in the following problem needs to be, so it must be set exactly as instructed. The answer is **1379.84grams**.

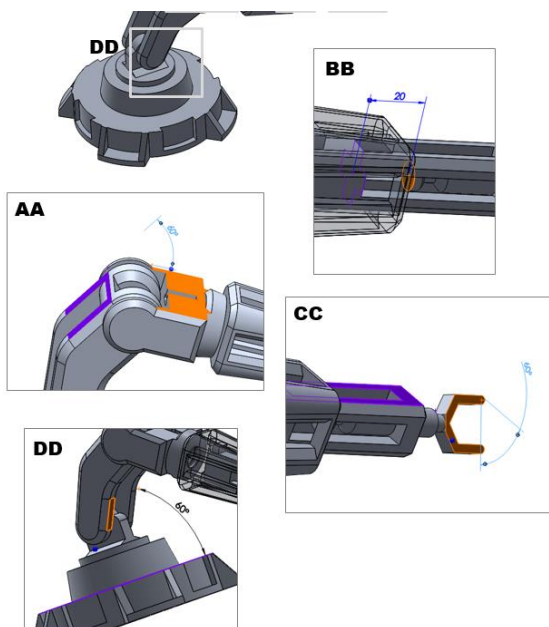


Question #1 1 Work Process

This question would be the most time-consuming problem in segment # 3. Create an **End Grip** part based on the provided drawing. Then, use the information in question to set the orientation and position of each component. The end grip model is relatively simple and can be created without difficulty. Creating a model and setting up the material of 1060 Alloy produces a mass of **11.60 grams** of the parts. Replace the **Endpin** with the created **End grip**. The next step is to set up the appropriate mate for each component as shown below. It is easy to be confused because you need to adjust the existing mate. If you configure and rebuild a mate, an error or warning may occur. This is a case of conflict with a previously set mate, so check them carefully.

In order to set the **AA** mate, the existing parallel mate between the lower arm and rotating adapter should be suppressed. It is recommended to **Suppress** rather than delete these parts (it can be handy for later use). Set an angle of **60 degrees** between the rotating adapter and the lower arm. **BB** sets the distance **20mm** between End Pin and End Probe using distance mate. **CC** sets the **60 degrees** angle between the end grip and the end probe. **DD** sets 60 degrees angle between the base and lower arm.

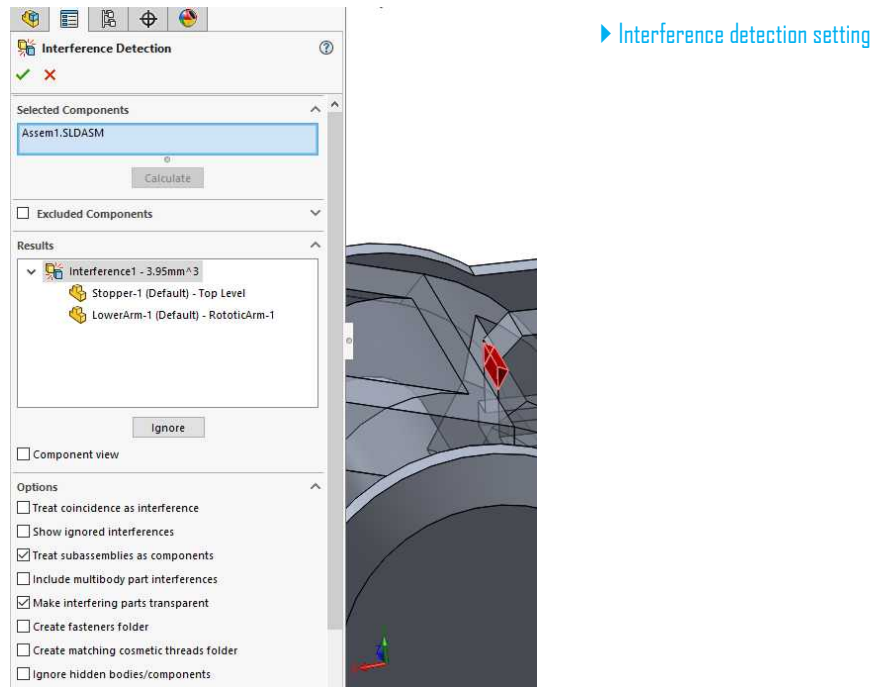
Then, measure the CG. Center of gravity should be **X = 55.89, Y = -33.31, Z = 38.27**. This is quite a straightforward process to find out the correct CG. Just follow the description exactly, then you will not miss the answer.



► Various mates in Q.11

Question #12 Work Process

If you are familiar with **Interference Detection**, this is an easy problem to complete in a couple of minutes. Adjust the two angle mates as described in the problem. Then select **Interference Detection** from the **Evaluate** menu and check "**treat subassemblies as components**" and "**make interfering parts transparent**" in options. Then click **Calculate** to show the list of the overlapped part and the volume of the overlapping area as shown below:

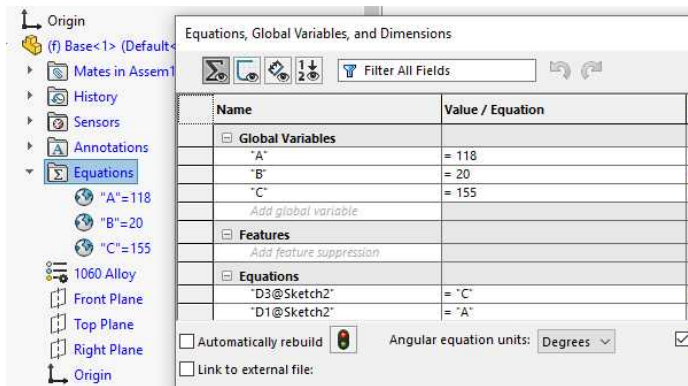


Question #13 Work Process

This is the last problem in this set. It may seem complicated as a mixture of previous question types. If the problem is complicated, break it by category and solve it step by step. So, this problem is a mixture of four types of problems: **updating global variables**, **adjusting sub-assembly mate**, **detecting collisions**, and creating a **new coordinate system**.

First, update the global variables of the equation. In the **Base** part of the **Model Tree**, RMB to select the **Edit Component** → **Manage Equation**, and update the global variable as shown below.

Global variables: A=118, B=20, C=155



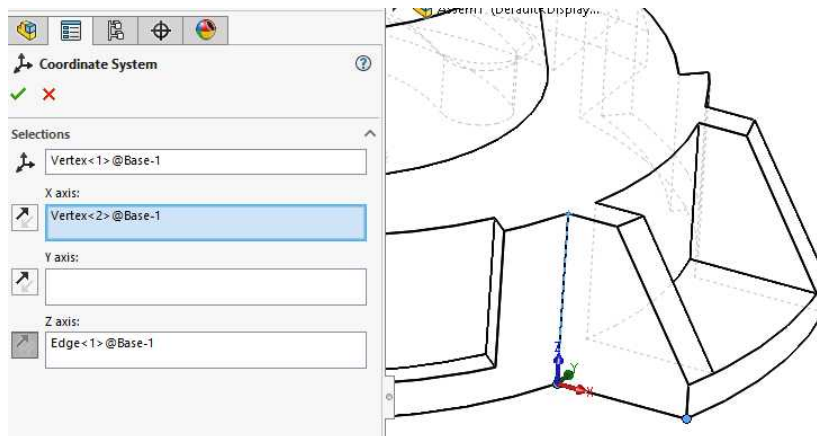
► Update Global Variables

Adjust the stopper's mate and suppress the lower arm and the adapter's angle mate. Then go to the sub-assembly (rotating arm assembly) and click '**Make subassembly flexible**' as shown below, so that it freely moves the components in the sub-assembly.

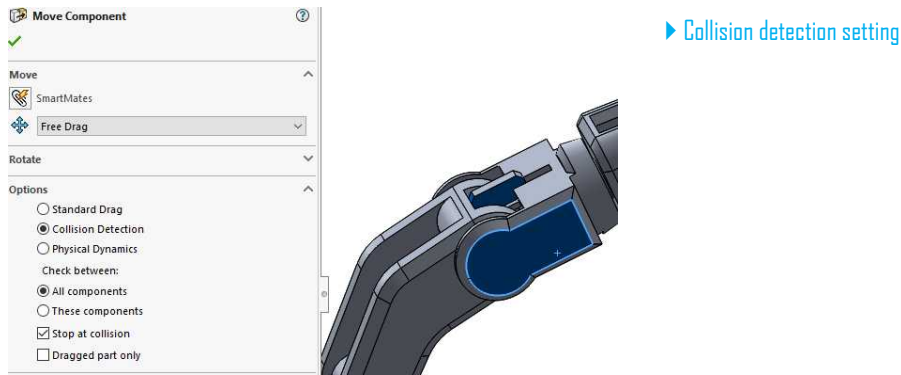


► Make flexible sub-assembly

Enter 60 degrees in the angle mate between lower arm and base. Create a new coordinate system as shown below. Then drag the sub-assembly's **Rotating Arm** counterclockwise to find collision detection. Measure CG with the new coordinate system while maintaining a collision state. The answer will be **X = -40.97, Y = 34.06, and Z = 46.25**.



► New coordinate system

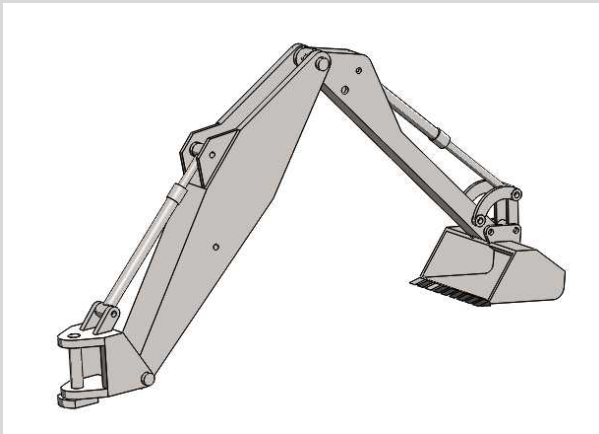


So far, you have solved all the problems of Segment # 3. Part modeling portion takes less time than the other two segments, but you may run out of time if you are unfamiliar with assembly features, because you need to configure the positions and orientations of many components with a different mate. The four additional exercises provided in this book will allow you to practice with the various components having the complicated mates to pass segment # 3 without difficulty.

4.3 Practice Exam Set 2

Exam Set 2 [Segment 3]

Certified SolidWorks Professional CSWP Segment 3 Test



- Segment 3 Assemblies
 - Creating a part
 - Add part to assembly
 - Insert sub-assembly
 - Modify mates
 - Collision/Interference
 - Replace coordinate

- Test duration: 80 min
- Total points: 190 points
- Total Questions: 13
- Pass score: 140

[Start Examination>](#)

Question 1 of 13

EXAM SET 2

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 13 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 80 minutes to complete this examination
- Minimum passing score is 140

Press **Start** Examination button to continue.

[Start](#)**Question 1.****Part Configuration Problem Set Description**

You will be creating an assembly of an excavator crane lift arm starting with the base. Some parts will be modeled by you and others will be supplied to you. You will be asked to do the following:

- Modeling of individual parts correctly
- Assembling and mating parts into assembly
- Interference detection
- Mate modification
- Part replacement

* Note: The images shown are not to scale due to differences in the parts being downloaded for each tester.

Please select **continue** to the next question.

[Continue](#)

Question 2 of 13

EXAM SET 2

For 20 points

Create Base

Build this part in SolidWorks

Unit system: MMGS (mm, g, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: Cast Alloy Steel

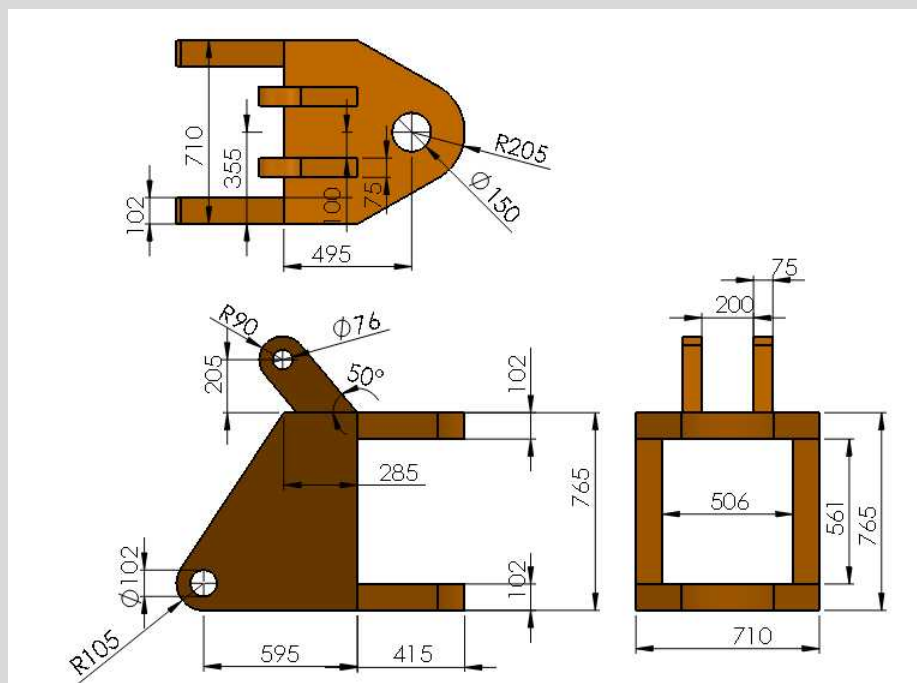
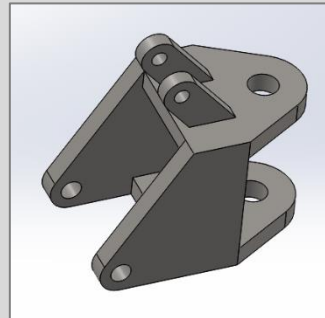
Density: 7300kg/m³

Part origin: Arbitrary

All holes through all unless shown otherwise.

What is the overall mass of the part (kg)?

- ☐ 1132.52 ☐ 1224.52
☐ 1123.85 ☐ 1212.14



Next Question >

Question 3 of 13

EXAM SET 2

For 10 points

Create Assembly from the Base

Unit system: MMGS (mm, g, sec)

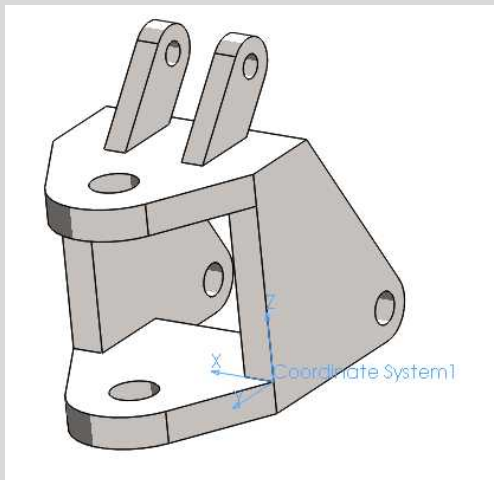
Decimal places: 2

Part Origin: Arbitrary

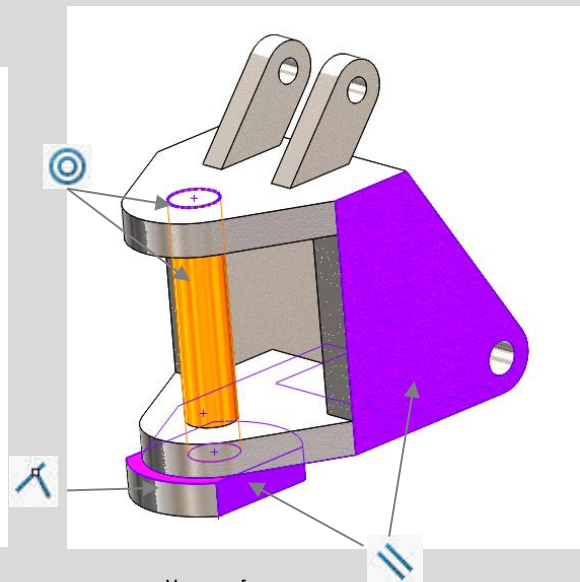
- Insert the base created in the last problem into an assembly
- * Note: this assembly will be referred to as the '**main assembly**'
- Create a coordinate system at the location and orientation shown in the first image.
- Add '**BasePin**' part and create proper mates as shown in image
- * Note: This coordinate system will be used throughout the problem set
- Using the create coordinate system as the output coordinate system, measure the center of gravity of the assembly

What is the center of gravity of the assembly(mm)?

Enter Value: X= Y= Z= |



New Coordinate System



Mate configuration

Next Question >

Question 4 of 13

EXAM SET 2

For 15 points

Add the top mount to assembly

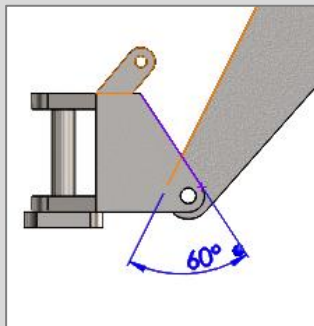
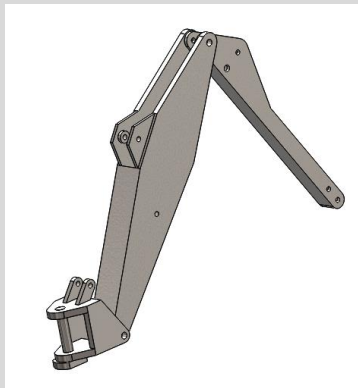
Unit system: MMGS (mm, g, sec)

Decimal places: 2

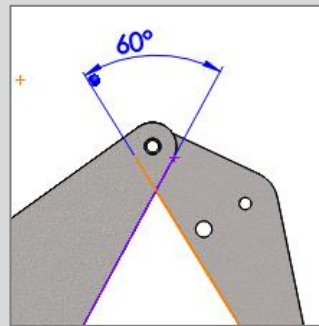
- Open the attached parts 'Feather' and 'Arm'
- Insert the Feather and Arm into the assembly that contains the base.
- Position the Feather with respect to the base as shown. Create all the necessary mates.
- Using the coordinate system created earlier as the output coordinate system. Measure the center of gravity of the assembly.

What is the center of gravity of the assembly (mm)?

Enter Value: |X= Y= Z= |



Mate configuration 1



Mate configuration 2

Next Question >

Question 5 of 13

EXAM SET 2

For 10 points

Creating Hydraulic Actuator Assembly

Unit system: MMGS (mm, g, sec)

Decimal places: 2

Material of Piston and Cylinder: AISI 304 Steel

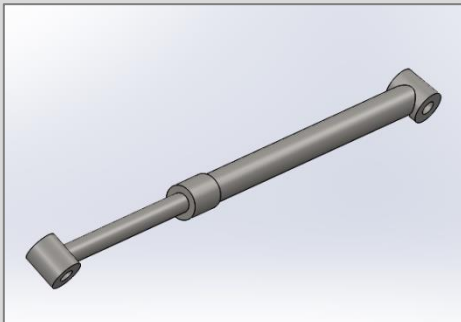
Density: 8000kg/m³Open the attached part '**Piston**' and '**Cylinder**' to create assembly.

*Note: This assembly will be referred to as the Actuator Assembly.

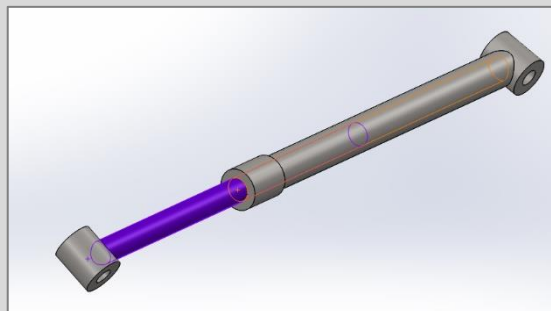
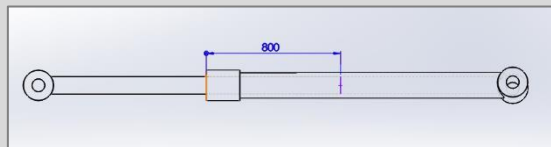
Save the assembly.

Measure the mass of the Actuator Assembly.

What's the overall mass of the assembly(kg)?

Enter Value: 

Actuator



Mate (distance) setup

[Next Question >](#)

Question 6 of 13

EXAM SET 2

For 15 points

Insert sub-assembly and collision detection

Unit system: MMGS (mm, g, sec)

Decimal places: 2

-Insert sub-assembly '**Actuator**' into main assembly as shown in image.

* Note: Modify or delete any previously placed mates if necessary

* Note: Set the sub-assembly as '**flexible**' to make proper mates with components in main assembly.

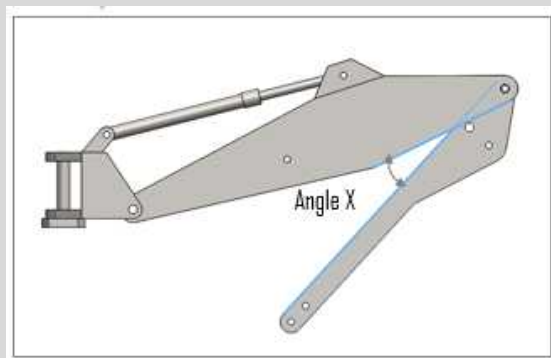
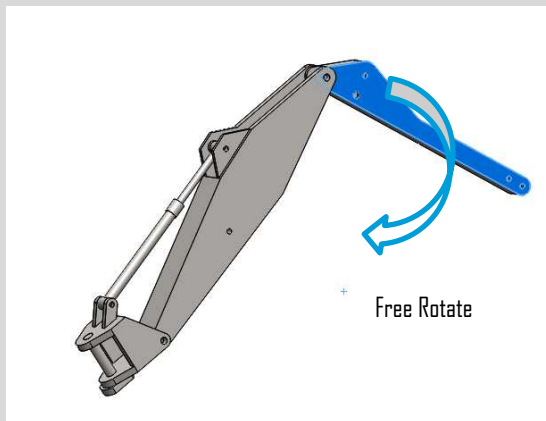
-Modify the mate of the arm to rotate freely described in image.

-With collision detection turned on (stop at collision '**ON**'), Rotate the Arm as shown in the image until the arm stop at collision.

Measure the angle, X, indicated in the image. (between 90~180 degree)

What's the measured angle, X (degree)?

Enter Value:


[Next Question >](#)

Question 7 of 13

EXAM SET 2

For 20 points

Insert sub-assembly and modify the coordinate system

Unit system: MMGS (mm, g, sec)

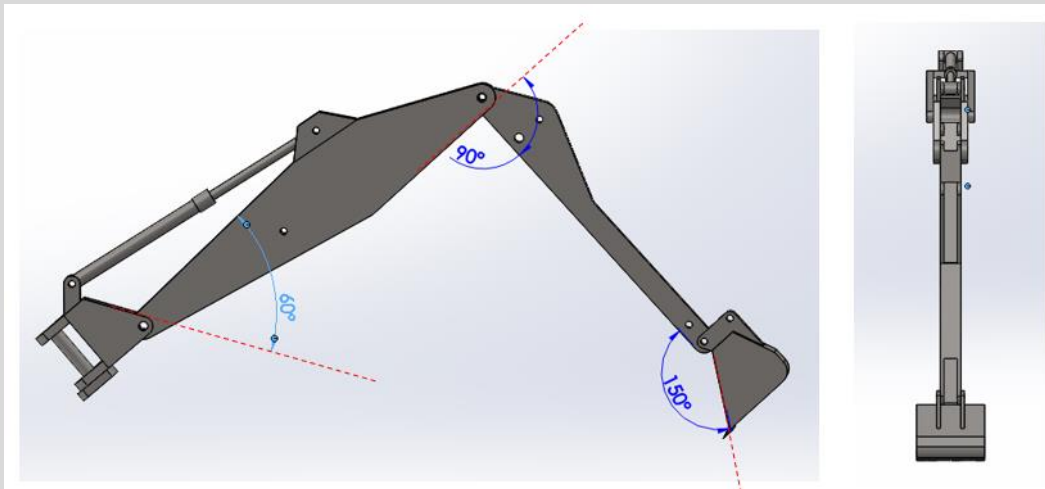
Decimal places: 2

- Insert '**Bucket**' into main assembly as shown in image.
- * Note: Modify or delete any previously placed mates if necessary
- Create angle mates of components as shown below image.
- Using the coordinate system created earlier as the output coordinate system.

Measure the center of gravity of the assembly.

What is the center of gravity of the assembly (mm)?

Enter Value: X= Y= Z=



Next Question >

Question 8 of 13

EXAM SET 2

For 20 points

Create Stabilizer and Assemble with the bucket.

Unit system: MMGS (mm, g, sec)

Decimal places: 2

Material of the Stabilizer: Cast Alloy Steel

Density: 7300kg/m³

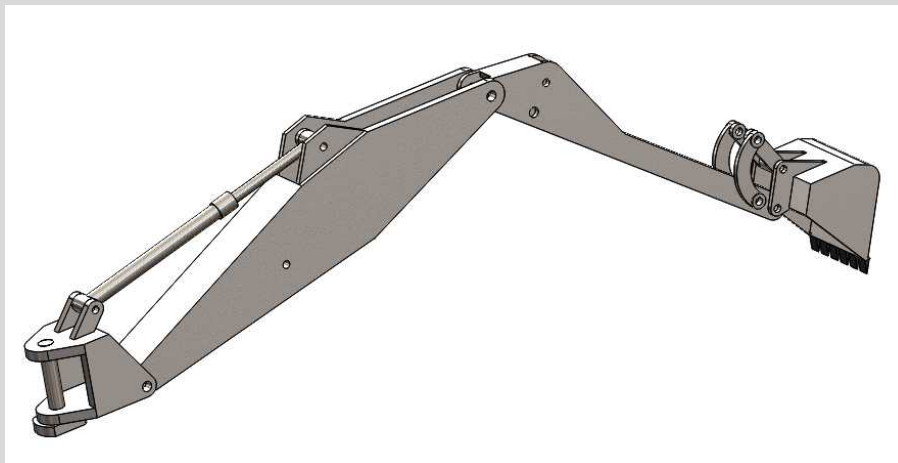
- Create the part '**Stabilizer**' based on the provided drawing.
- Assign the material **Cast Alloy Steel** to the part
- Insert '**Stabilizer**' and '**Tension bar**' into the main assembly and mate it following the orientation and position shown in the image.

* Note: Remove and modify the previous mates to comply with the new orientation and mates shown here. Some mates in subassembly might need to be modified.

- Using the created coordinate system as the output coordinate system.

Measure the mass of the assembly.

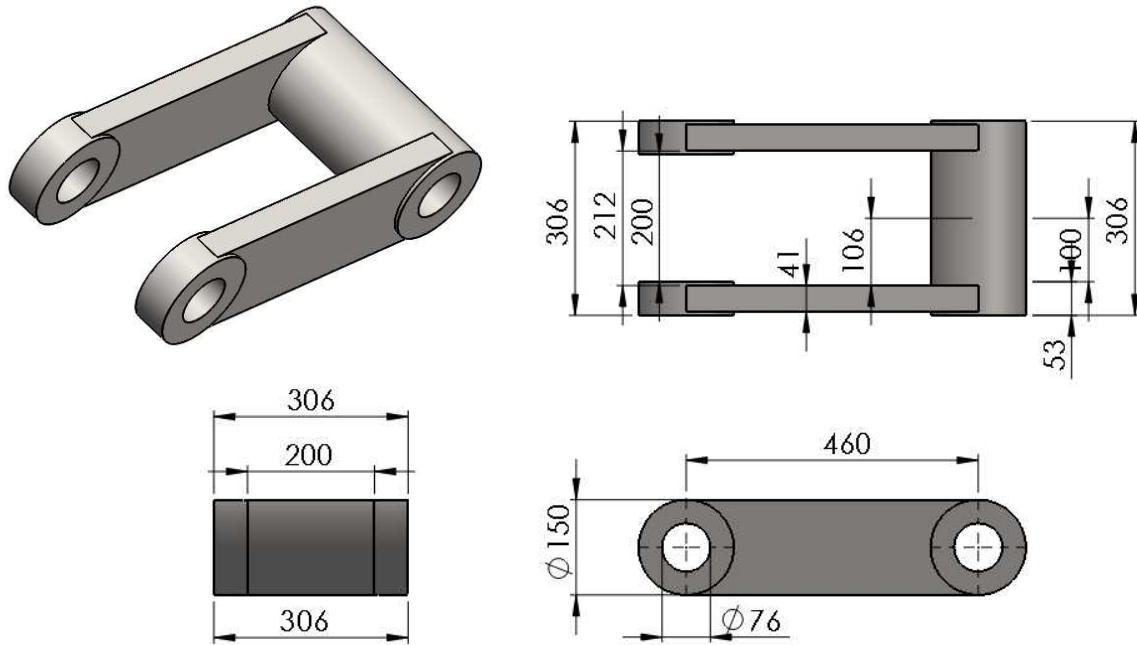
What is the overall mass of the assembly (kg)?

Enter Value: 

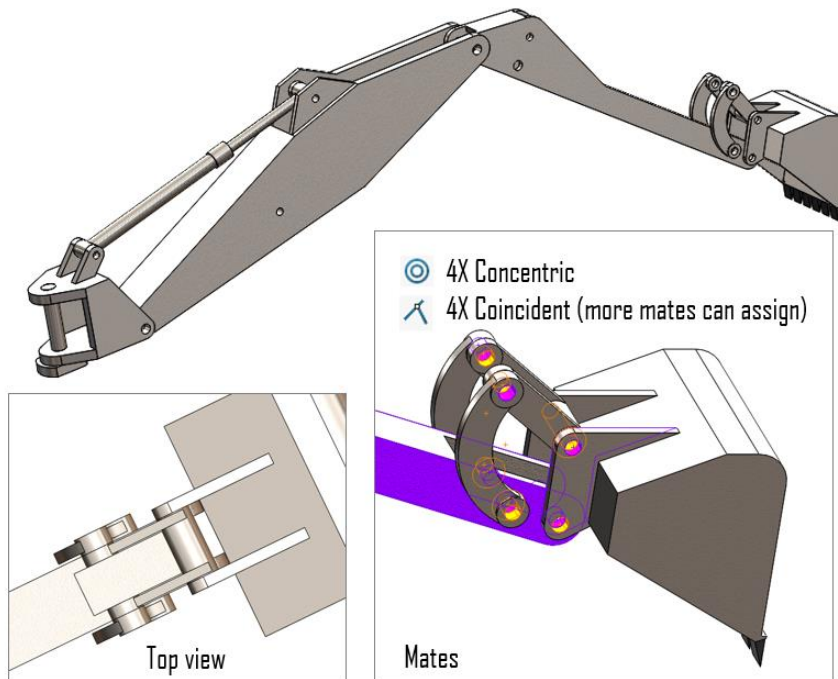
Main Assembly

Next Question >

Reference Image for Q8 of Exam Set 2 >>



Stabilizer



Main Assembly

Question 9 of 13

EXAM SET 2

For 20 points

Add additional actuator assembly to the main assembly.

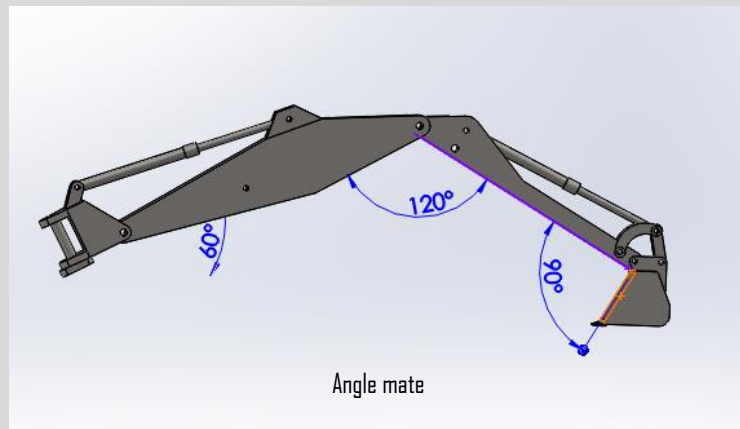
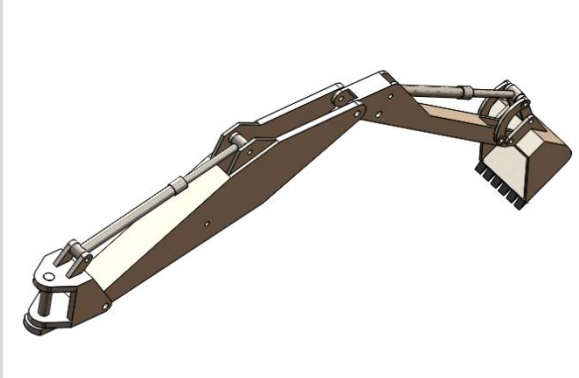
Unit system: MMGS (mm, g, sec)

Decimal places: 2

- Insert the actuator assembly into the main assembly and create mates as shown in image.
- * Note: Modify or delete any previously placed mates if necessary
- * Note: Set the sub-assembly as 'flexible' to make proper mates with components in main assembly.
- Set angle mates between components (see image)
- Using the created coordinate system as the output coordinate system.
- Measure the center of gravity of the main assembly.

What's the center of gravity of the main assembly(mm)?

Enter Value: |X= Y= Z= |



Next Question >

Question 10 of 13

EXAM SET 2

For 15 points

Modify the parameter and insert parts

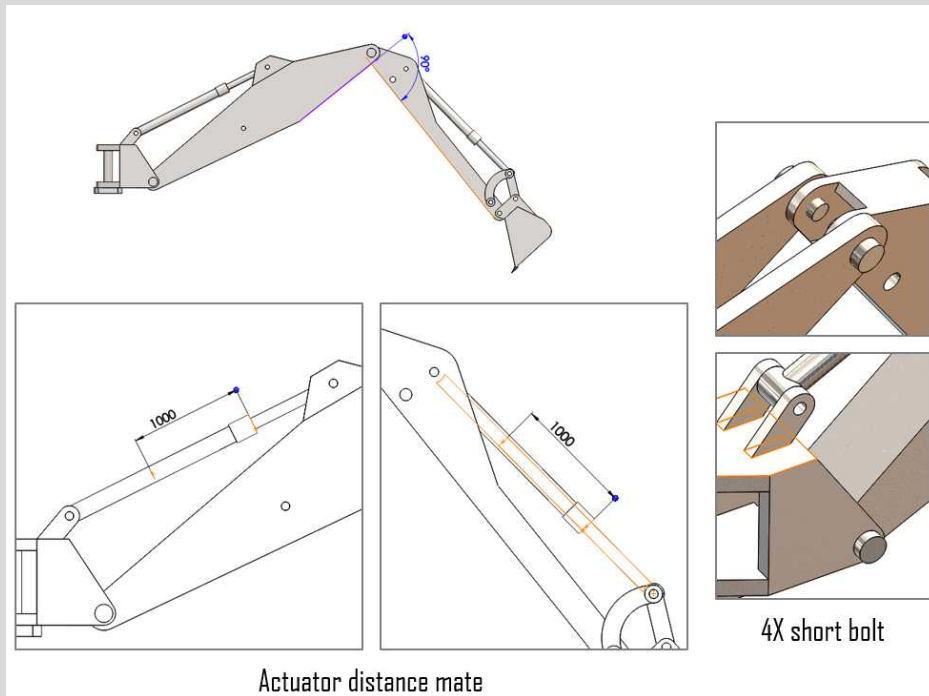
Unit system: MMGS (mm, g, sec)

Decimal places: 2

- Change the parameters of the mates as shown in the images. Other mates are same as directed in the previous configuration.
- Add Four of 'Short Bolt' to the main assembly as shown below image.
- Using the created coordinate system as the output coordinate system.
- Measure the center of gravity of the main assembly.

What's the center of gravity of the main assembly(mm)?

Enter Value: |X= Y= Z= |



Next Question >

Question 11 of 13

EXAM SET 2

For 10 points

Replace coordinate system and measure center of gravity

Unit system: MMGS (mm, g, sec)

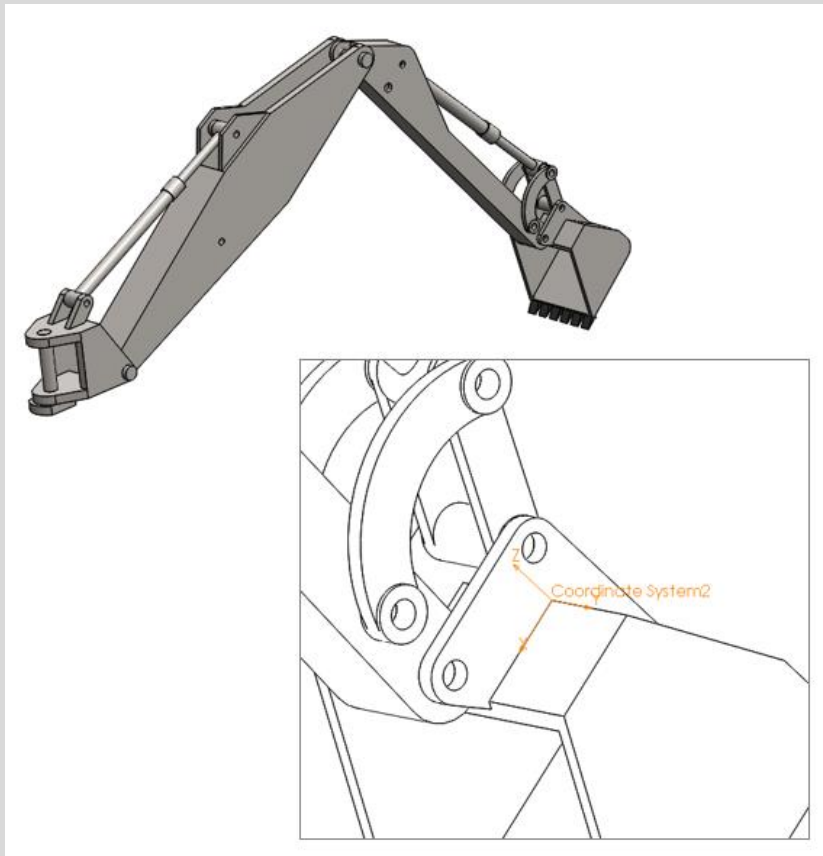
Decimal places: 2

- Create new coordinate system as shown below.
- *Note: All mates and positions of the components should be kept as same
- Using the created coordinate system as the output coordinate system.

Measure the center of gravity of the main assembly.

What's the center of gravity of the main assembly(mm)?

Enter Value: X= Y= Z= |



Next Question >

Question 12 of 13

EXAM SET 2

For 15 points

Interference Checking in the main assembly

Unit system: MMGS (mm, g, sec)

Decimal places: 2

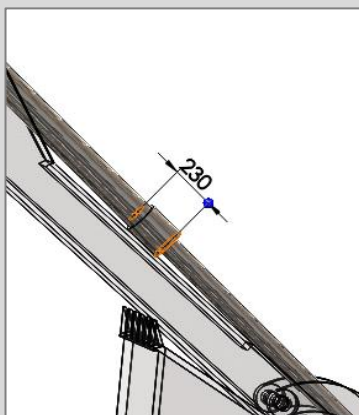
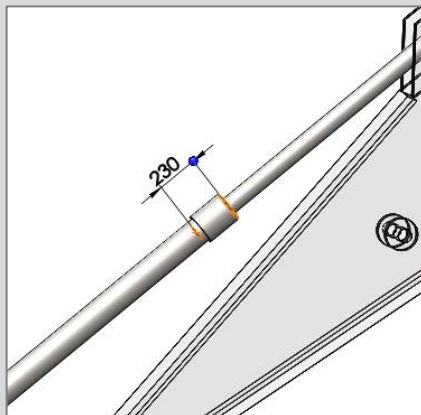
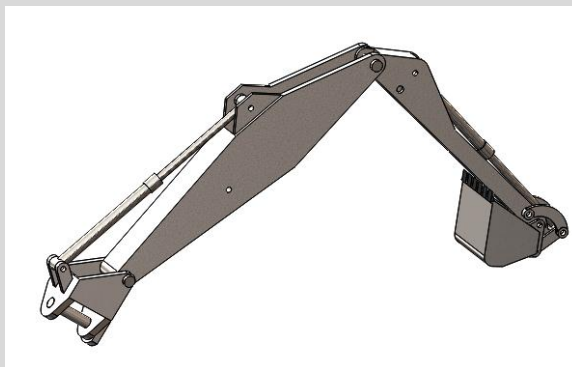
- Change the parameters of the mates as shown in the images. Other mates are same as directed in the previous configuration.
- Perform an interference Detection check on the main assembly while turning on the following options

- Treat subassembly as components
- Make interference parts transparent

Note: All other interference detection options will be unchecked (OFF)

Select all the components that are found to cause interferences or No interferences detected if no interference are found

Name the components:



Next Question >

Question 13 of 13

EXAM SET 2

For 20 points

Replace new bucket and find position at specific configuration.

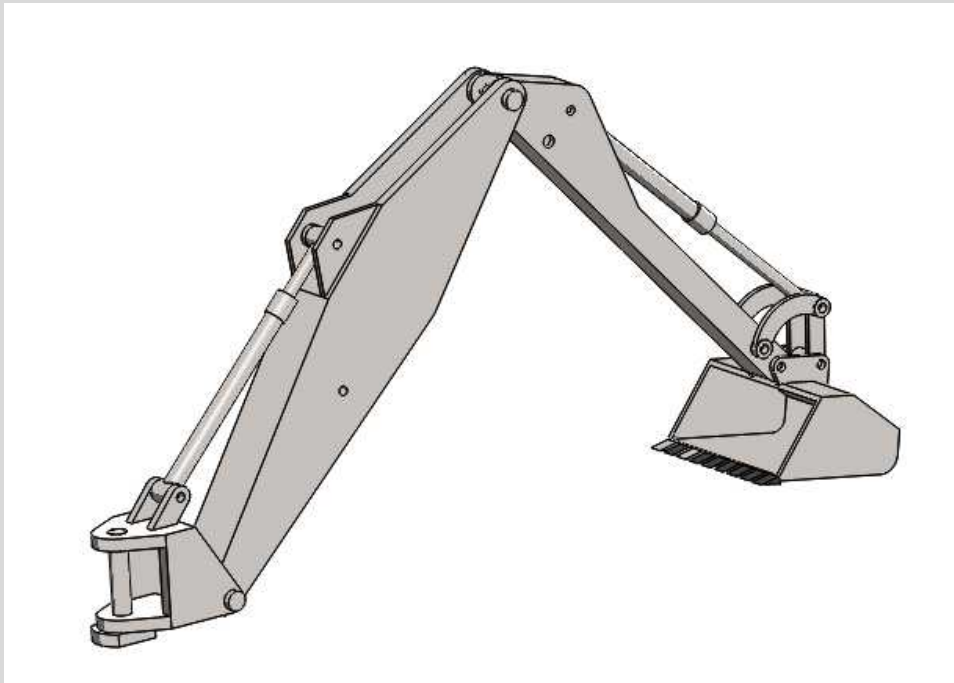
Unit system: MMGS (mm, g, sec)

Decimal places: 2

- Replace the new bucket with existing bucket.
- Remove the distance mate in 'Actuator' sub-assembly and set as 'Flexible'
- *Note: Two actuator sub-assemblies should be extend/retract independently.
- Modify the mates as shown below images. Maintain the same mates of the rest of the components as previously directed.
- Create a new coordinate system in the position and orientation shown in the image. Using this coordinate system, measure the center of the gravity of the assembly.

What is the center of gravity of the assembly (mm)?

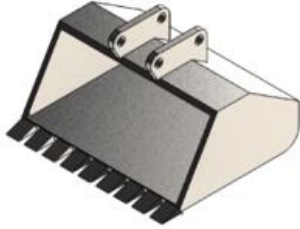
Enter Value: |X= |Y= |Z= |



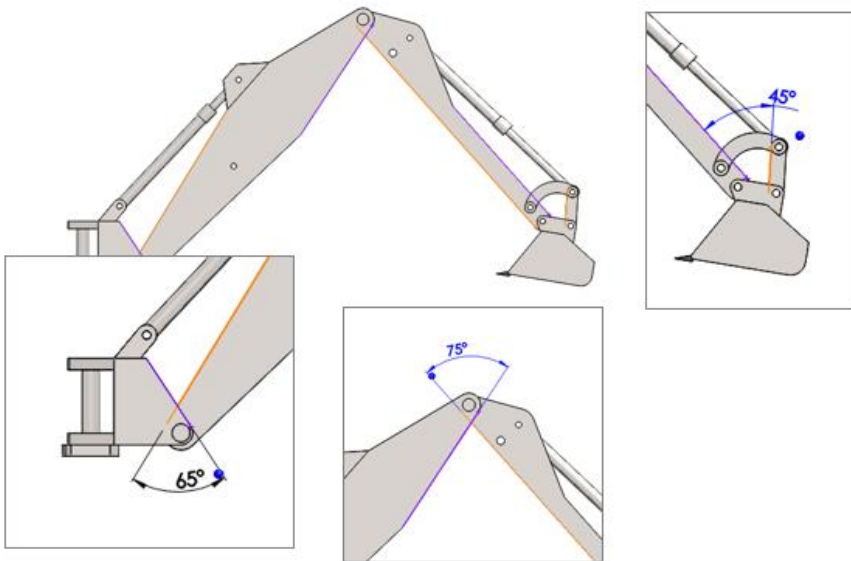
Next Question >

Reference Image for Q13 of Exam Set 2 >>

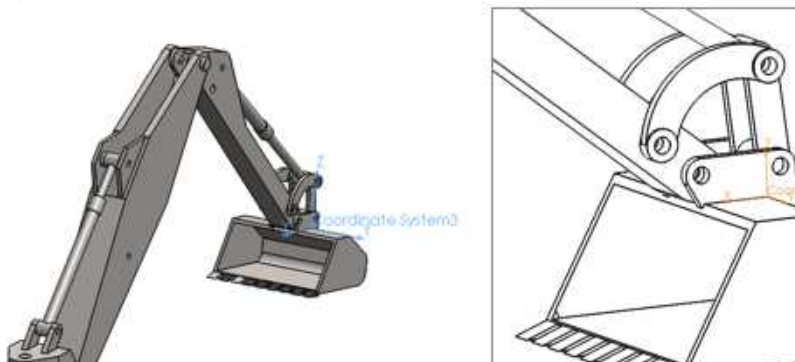
Replace new bucket with existing one



Modify angle mates



Create new coordinate system



Answer Sheet

EXAM SET 2

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information		-
2	Create a part	20	☐ 1123.85
3	Create an assembly	10	X=355.00, Y=-86.40, Z=244.00
4	Add a part to assembly	15	X=355.00, Y=-1973.52, Z=1679.31
5	Create Sub-assembly	10	324.22
6	Collision detection	25	21.29
7	Insert Sub-assembly	20	X=354.99, Y=-3023.31, Z=-830.61
8	Create part and assemble	20	9396.88
9	Insert sub-assembly	20	X=354.99, Y=-3469.24, Z=-829.60
10	Modify mates	15	X=354.99, Y=-3211.83, Z=852.88
11	Replace coordinate system	10	X=2016.61, Y=-202.99, Z=3569.97
12	Interference checking	15	Bucket, Arm, Short Bolt (2)
13	Replace a part and find position	20	X=3581.76, Y=-203.01, Z=337.98
	Total	190	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

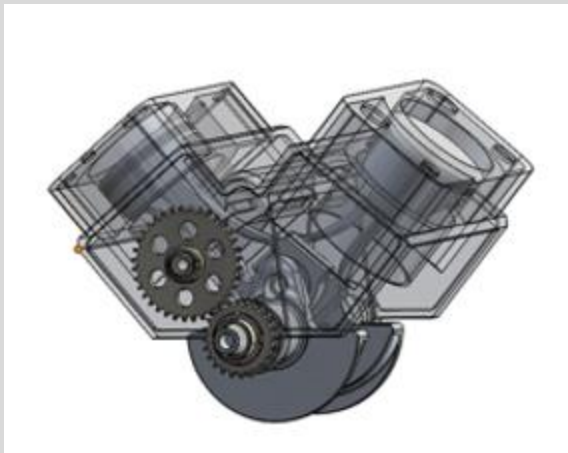
- What's your score?
- Do you finish segment 3 test within 80 minutes? ☐ Yes ☐ No
- Do you pass segment 3 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating sub-assembly
 - ☐ Creating Mates
 - ☐ Moving Parts
 - ☐ Creating Coordinate
 - ☐ Modifying Advanced Mates
 - ☐ Part Creation

END of EXAM SET No. 2

4.4 Practice Exam Set 3

Exam Set 3 [Segment 3]

Certified SolidWorks Professional CSWP Segment 3 Test



- Segment 3 Assemblies
 - Creating Piston part
 - Add part to assembly
 - Insert sub-assembly
 - Gear mates
 - Collision/Interference
 - Replace part
- Test duration: 80 min
- Total points: 190 points
- Total Questions: 13
- Pass score: 140

[Start Examination>](#)

Question 1 of 13

EXAM SET 3

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 13 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 80 minutes to complete this examination
- Minimum passing score is 140

Press **Start** Examination button to continue.

[Start](#)**Question 1.****Part Configuration Problem Set Description**

You will be creating an assembly of an engine cylinder starting with the cylinder block. Some parts will be modeled by you and others will be supplied to you. You will be asked to do the following:

- Modeling of individual parts correctly
- Assembling and mating parts into assembly
- Interference detection
- Mate modification
- Part replacement

* Note: The images shown are not to scale due to differences in the parts being downloaded for each tester.

Please select **continue** to the next question.

[Continue](#)

Question 2 of 13

EXAM SET 3

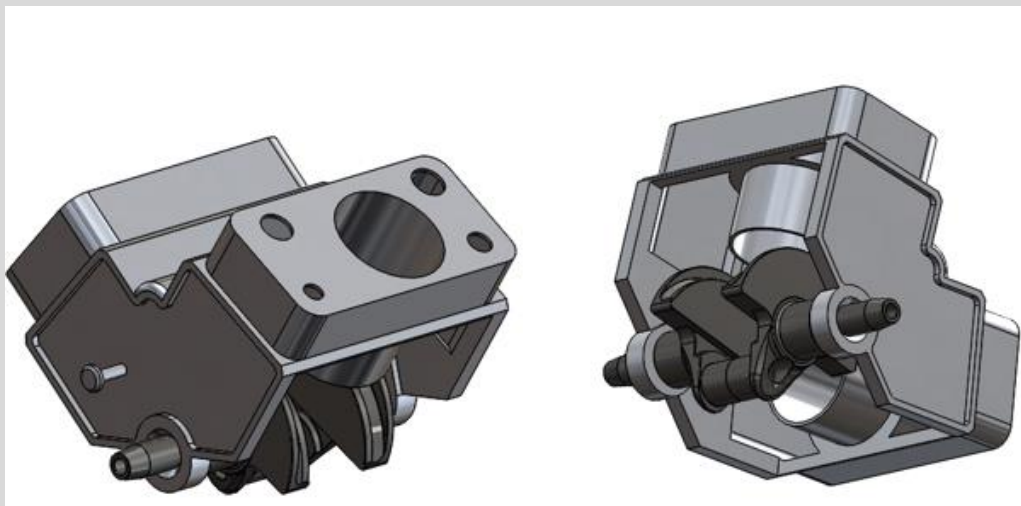
For 20 points

Create Assembly**Unit system:** MMGS (millimeter, gram, sec)**Decimal places:** 2**Part Origin:** Arbitrary

- Open the part '**Cylinder block**' part and create assembly.
- This assembly will be referred to as the '**Engine assembly**'
- Insert two '**flywheel**' and create necessary mates to comply with the image as shown below.
- * Note: use width mate to define proper position of flywheel
- Create new coordinate system as shown below.
- * Note: This coordinate system will be used throughout the problem set
- Using the create coordinate system as the output coordinate system, measure the center of gravity of the assembly

What is the center of gravity of the assembly (mm)?

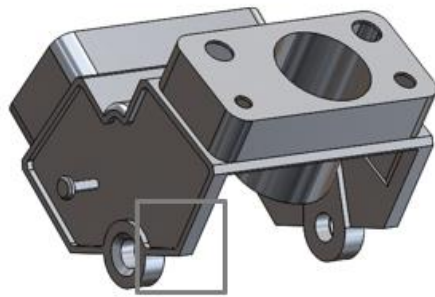
Enter Value: [X= Y= Z=]



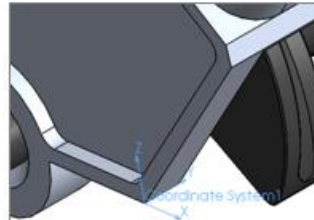
Engine Assembly (Initial state)

Next Question >

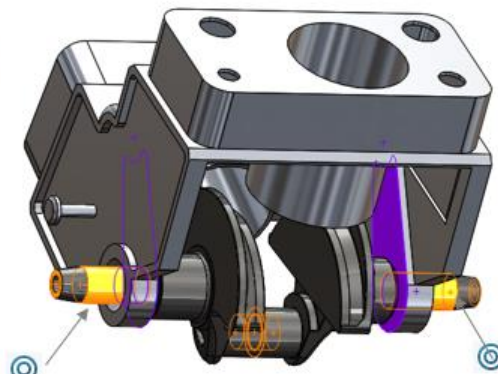
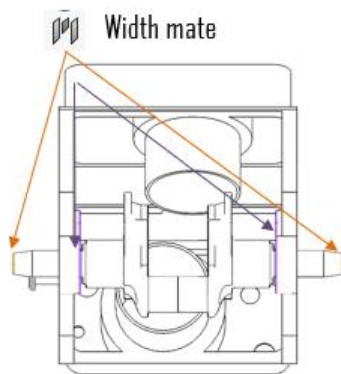
Reference Image for Q2 of Exam Set 3 >>



Cylinder block part



New coordinate system



Engine assembly

Question 3 of 13

EXAM SET 3

For 20 points

Create Piston Part

Build this part in SolidWorks

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

Material: 1060 Aluminum Alloy

Density: 7300kg/m³

All holes through all unless shown otherwise.

What is the overall mass of the part (kg)?

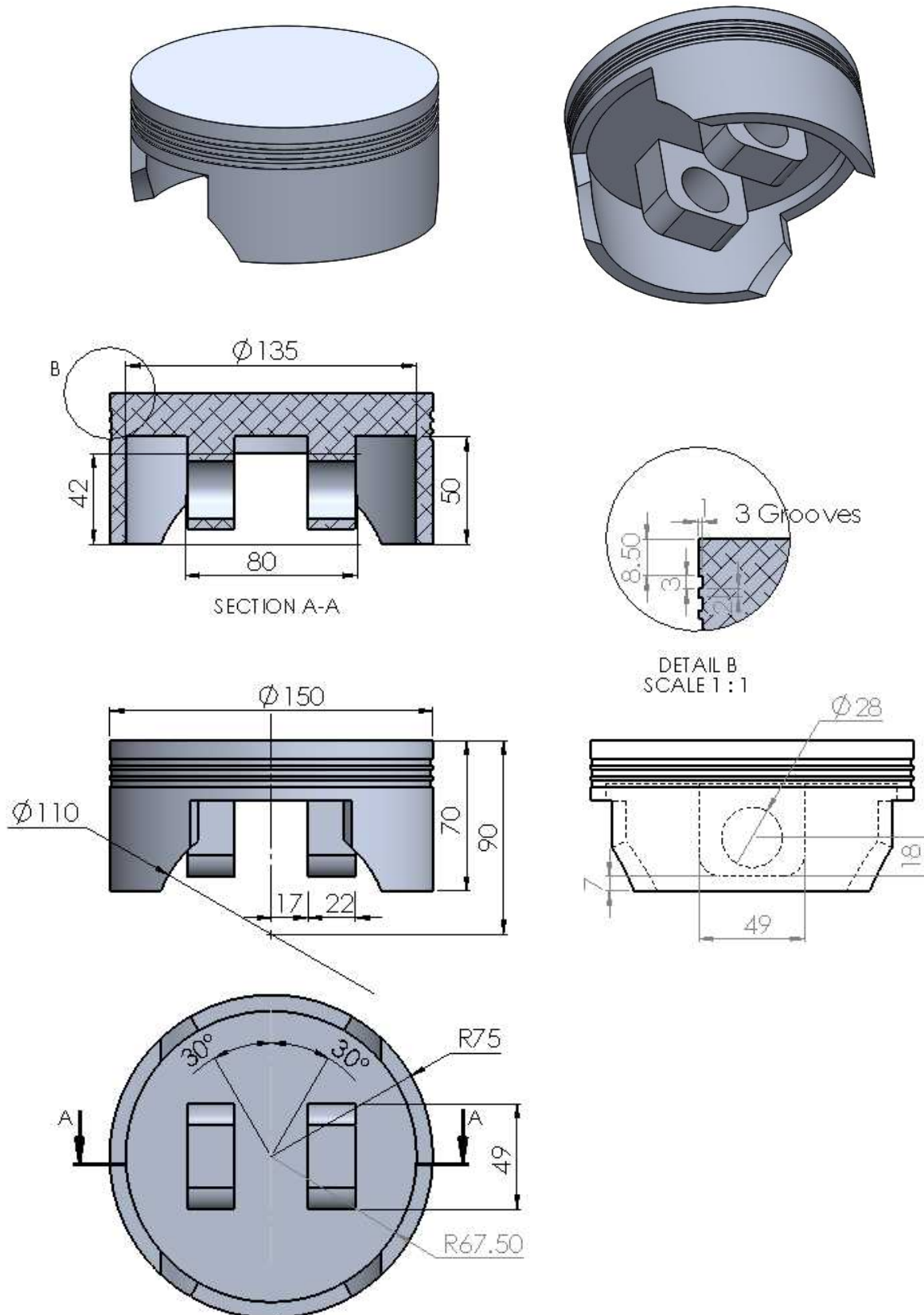
- ☐ 1427.03 ☐ 1419.52
☐ 1475.22 ☐ 1421.13



ISO view of Piston Part

Next Question >

Reference Image for Q3 of Exam Set 3 >>



Question 4 of 13

EXAM SET 3

For 10 points

Create Sub-Assembly

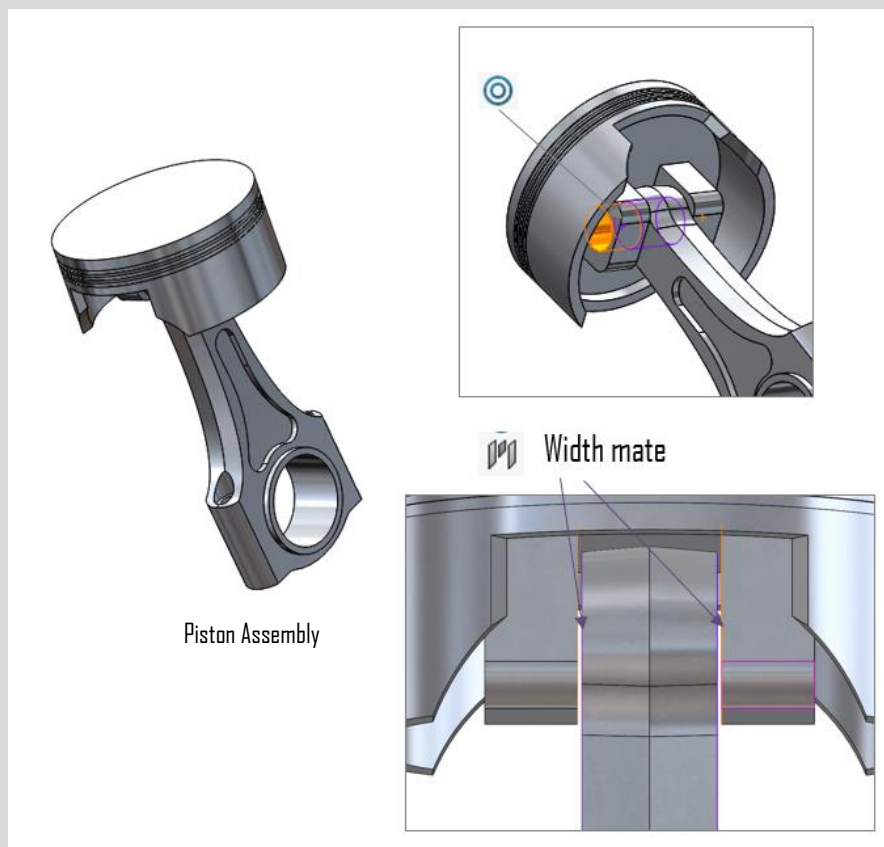
Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

-Insert the '**Piston**' part in the last problem into an assembly* Note: this assembly will be referred to as the '**Piston assembly**'-Add '**Connecting Rod**' part and create proper mates as shown in image

What is the total mass of the assembly (grams)?

Enter Value: []

Next Question >

Question 5 of 13

EXAM SET 3

For 10 points

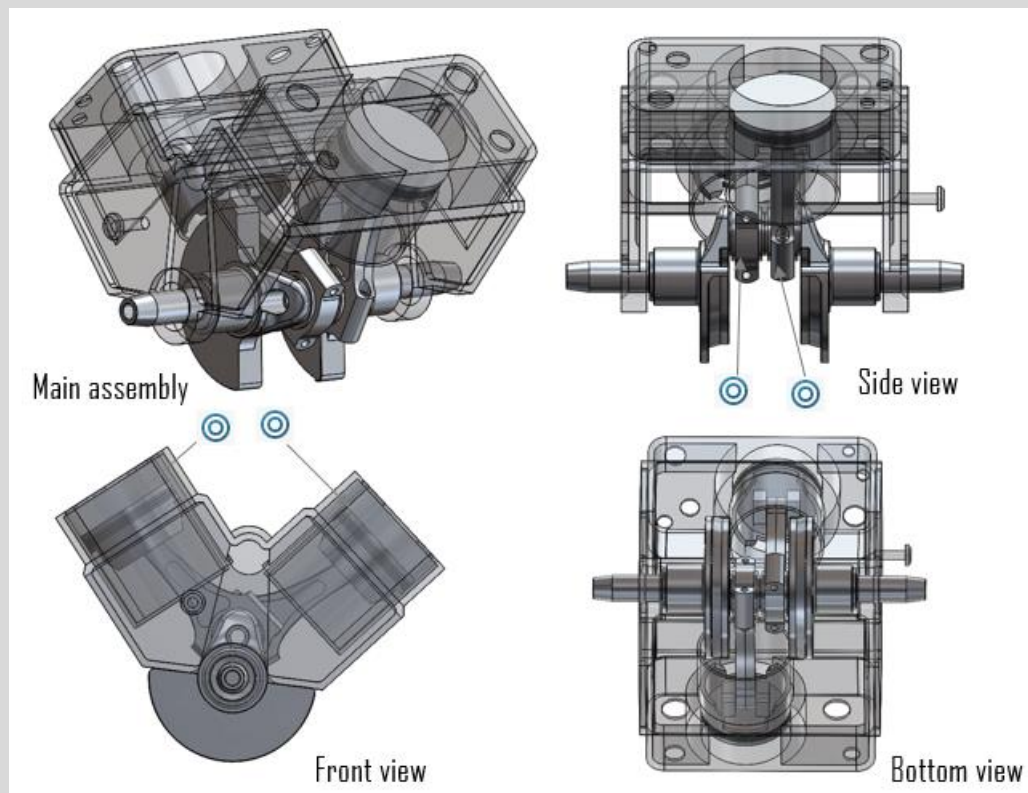
Insert sub-assembly into main assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

- Insert the '**Piston**' assembly created in the last problem into a main assembly
- Create necessary mates to comply with the configuration as shown in image.
- * Note: Set the sub-assembly as '**Flexible**' to rotate connecting rod freely
- * Note: Pistons and cylinder block holes should be mated concentrically.
- Measure the overall mass of the assembly
- What is the overall mass of the assembly (grams)?

Enter Value: []

Next Question >

Question 6 of 13

EXAM SET 3

For 15 points

Modify the mates

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Create parallel mate between flywheel surface and cylinder block surface as shown in image.

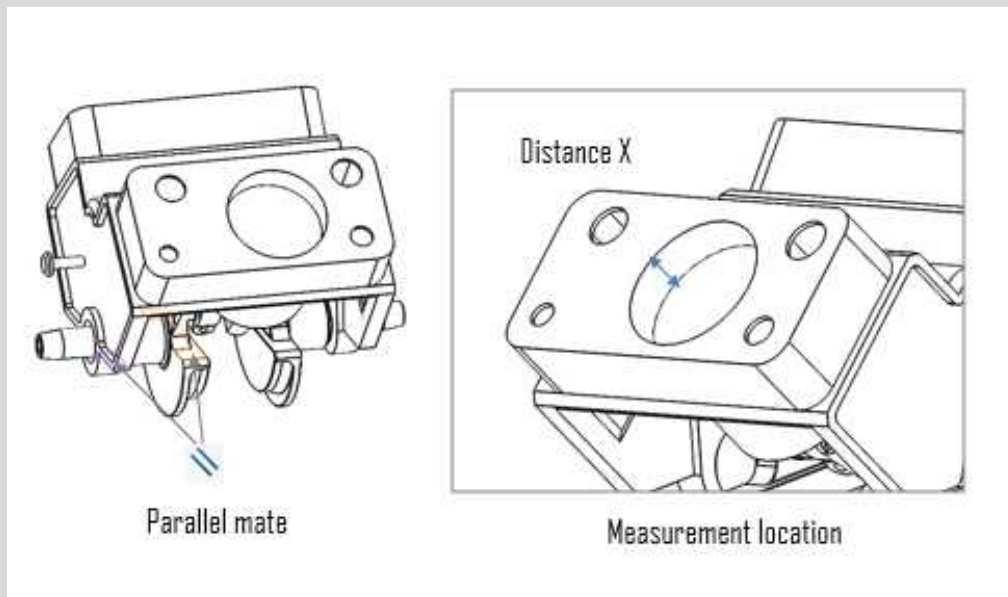
*Note: Sub-assembly should be '**Flexible**' to be assembled properly.

- Measure the normal distance '**X**' between top surface of the piston and top surface of the cylinder block.

*Note: Measured normal distance in both sides should be same. If not, recheck the mates for proper assembly.

What is the measured distance '**X**' (mm)?

Enter Value: []

[Next Question >](#)

Question 7 of 13

EXAM SET 3

For 10 points

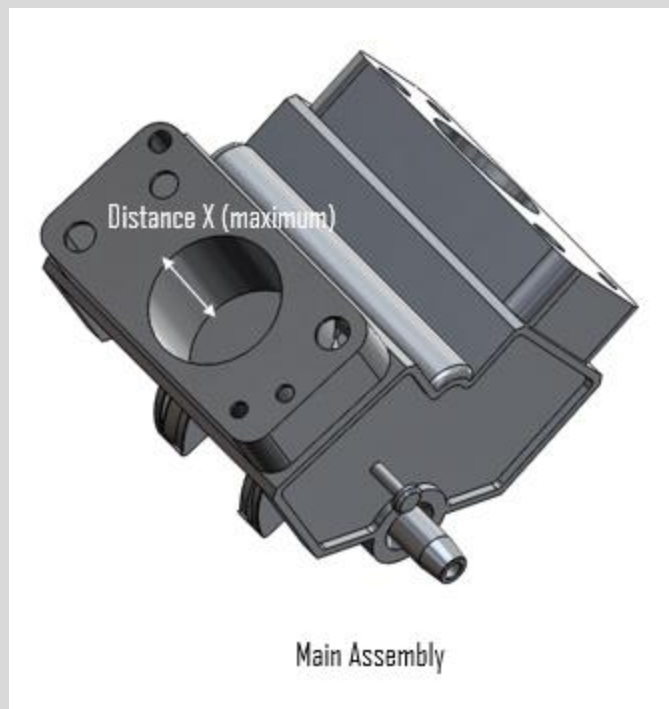
Find specific configuration by adding mate

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- There will be maximum distance 'X' (designated in question 6) at specific configuration.
- Find the maximum distance 'X' by adding a mate.
- * Note: Both cylinders should have same max distance 'X'.
- Measure the max distance 'X'

What is the max distance 'X' (mm)?

Enter Value: []

Next Question >

Question 8 of 13

EXAM SET 3

For 20 points

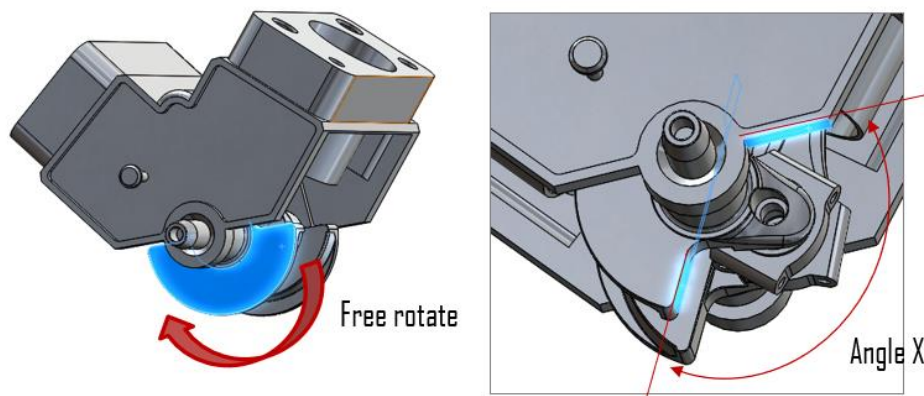
Collision detection

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Modify the mates created in previous question to make the flywheel rotate freely as shown in image.
- With collision detection turned on (stop at collision '**ON**'), Rotate the flywheel as shown in the image until the collision is detected.
- * Note: Flywheel in the front side where additional circular pin is located on the wall of cylinder block should be selected (see image).
- Measure the angle, X, indicated in the image. (between 90~180 degree)

What's the measured angle, X (degree)?

Enter Value: 

Next Question >

Question 9 of 13

EXAM SET 3

For 20 points

Insert additional gears and set mates

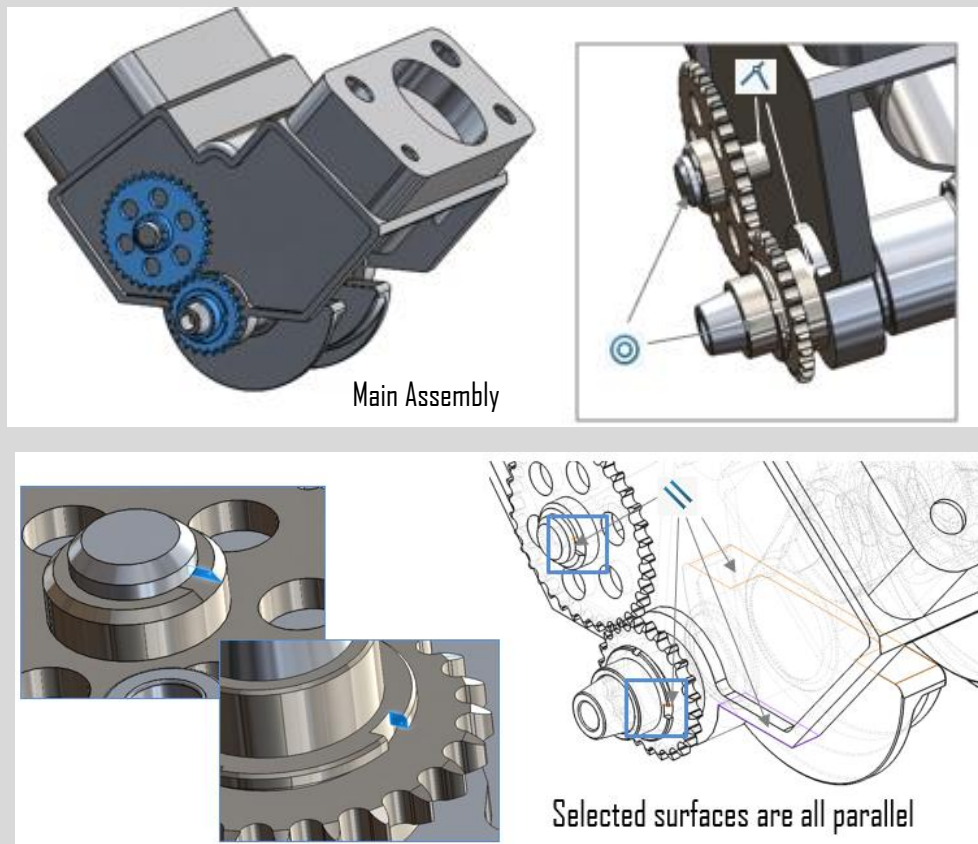
Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Insert two of '**Sprocket Gear**' into the main assembly as shown in image.
- Create necessary mates following the orientation and position shown in the image. This position and orientation refer to as '**Initial Setup**' in following questions.
- *Note: Gear and axis pin should be mated concentrically and surface of the gear hub should be contacted on the surface of the cylinder block
- Using the created coordinate system as the output coordinate system, measure the center of gravity of the assembly.

What is the center of gravity of the assembly (mm)?

Enter Value: [X= Y= Z=]



Next Question >

Question 10 of 13

EXAM SET 3

For 20 points

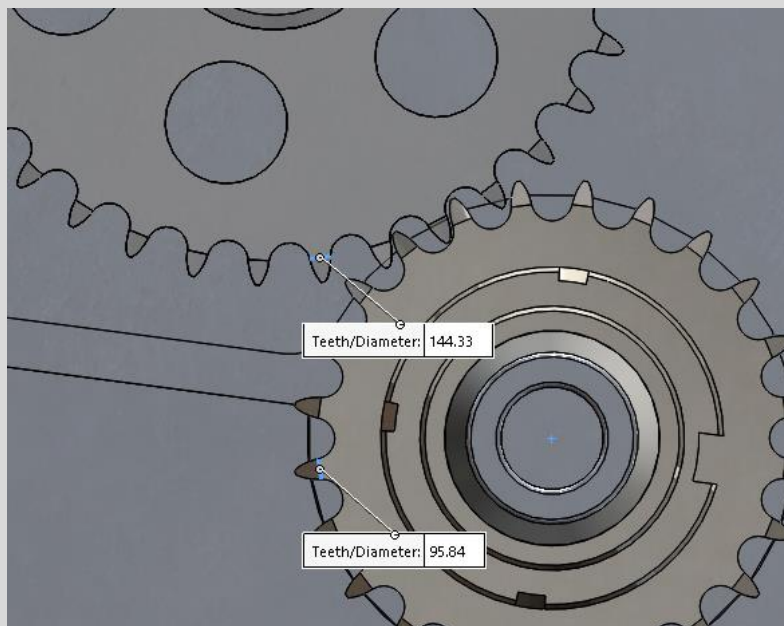
Create Gear Mate between Sprocket Gears

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Keep the mate generated in previous question.
- Create Gear mate between sprocket gears as shown in image.
- * Note: Gear ratio should be setup by selecting one arc of the gear teeth designated in image. Gears should be rotated in opposite directions.
- Remove the necessary parallel mates associated with cylinder block (fixed part) so that the gears and flywheels with piston assemblies can move together.
- Rotate the large sprocket gear by 45 degree in counter-clockwise direction as shown in image.
- * Note: Exact rotation can be defined by use of angle mate
- Then, the connected components should be moved together.
- Measure the normal distance 'X' (designated in Question 6)

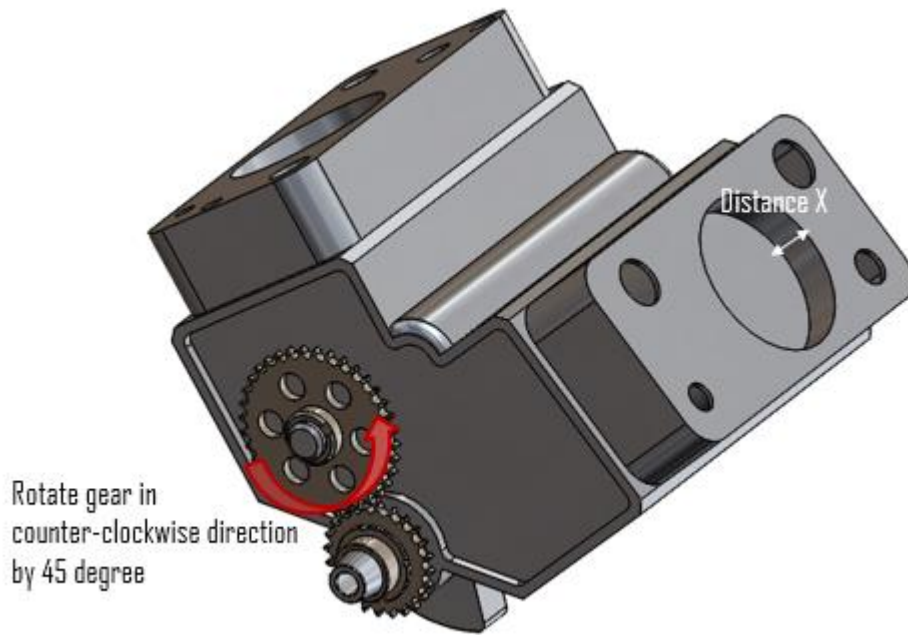
What's the measured distance 'X' (mm)?

Enter Value: 

Gear mate setup

[Next Question >](#)

Reference Image for Q10 of Exam Set 3 >>



Question 11 of 13

EXAM SET 3

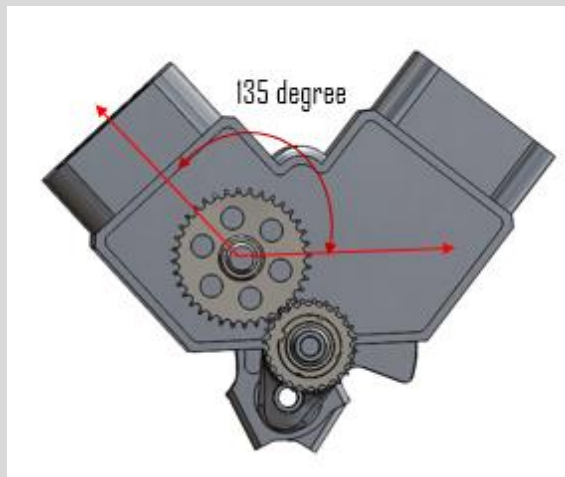
For 15 points

Interference Checking in the main assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Keep the all mates designated in previous question.
 - Rotate the large sprocket gear by **135** degree in counter-clockwise direction as shown in image.
 - * Note: Exact rotation can be defined by use of angle mate.
 - Perform an interference Detection check on the main assembly while turning on the following options
 - Treat subassembly as components
 - Make interference parts transparent
 - * Note: All other interference detection options will be unchecked (OFF)
 - * The position and orientation of 'Initial setup' might be used for multiple measurements.
- Select all the components that are found to cause interferences or No interferences detected if no interference are found

Name the components: []

Next Question >

Question 12 of 13

EXAM SET 3

For 10 points

Replace coordinate system and measure center of gravity

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Keep the position and orientation as directed in previous question.
- Create new coordinate system as shown below.

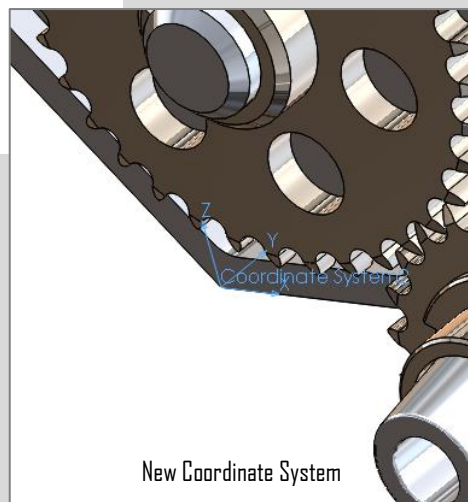
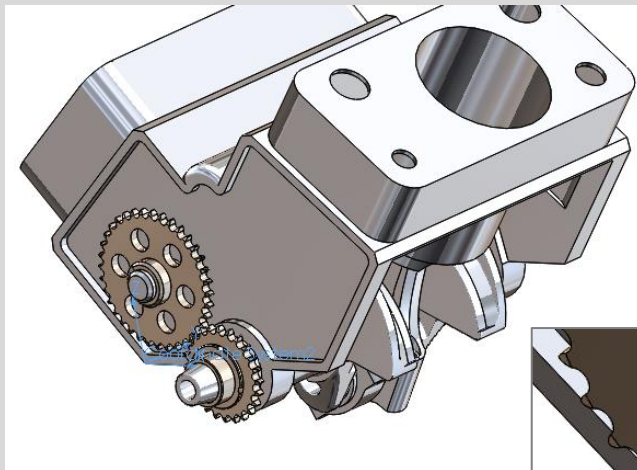
*Note: All mates and positions of the components should be kept as same

Using the created coordinate system as the output coordinate system.

- Measure the center of gravity of the main assembly.

What's the center of gravity of the main assembly?

Enter Value: [X= Y= Z=]

[Next Question >](#)

Question 13 of 13

EXAM SET 3

For 10 points

Replace the part and measure the center of gravity

Unit system: MMGS (millimeter, gram, sec)

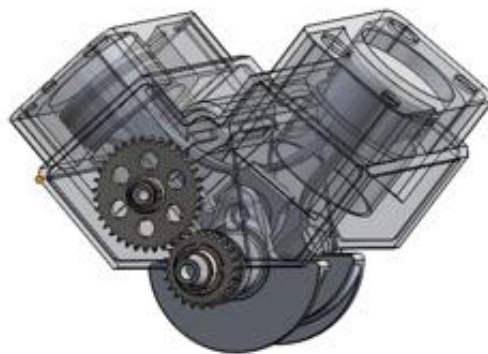
Decimal places: 2

- Roll back to position and orientation designated in 'Initial Setup'.
 - Replace the connecting rod (new design) with existing connecting rod in 'Piston assembly' and replace it in main assembly.
- Using the created coordinate system in Q12. as the output coordinate system.
- Measure the center of gravity of the main assembly.

What's the center of gravity of the main assembly?

Enter Value: [X= Y= Z=]

Updated piston assembly with new design of the connecting rod



Updated Main assembly

Next Question >

Answer Sheet

EXAM SET 3

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Create Assembly	20	X = -130.27, Y = 199.28, Z = 136.48
3	Create Piston Part	20	☐ 1421.13
4	Create Sub-assembly	10	2429.24
5	Insert Sub-assembly	10	39355.36
6	Modify the mates	15	42.71
7	Find specific condition	10	145.00
8	Collision Detection	20	117.56
9	Insert Gears and set Mates	20	X=-134.37, Y=187.28, Z=130.47
10	Create Gear Mates	20	33.93
11	Interference Checking	15	Flywheel, Piston
12	Replace Coordinate System	15	X=125.26, Y=187.28, Z=126.12
13	Replace a Part	15	X=125.60, Y=187.20, Z=131.90
	Total	190	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

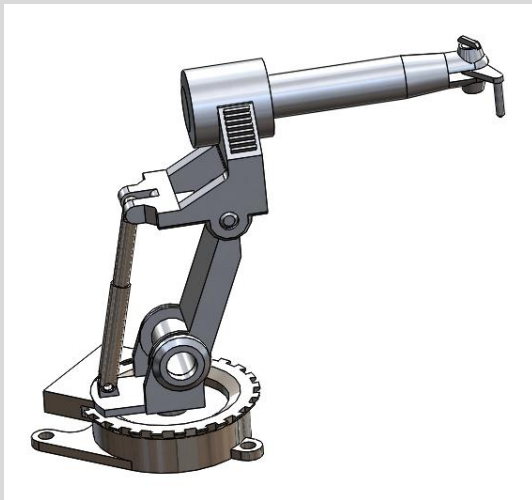
- What's your score?
- Do you finish segment 3 test within 80 minutes? ☐ Yes ☐ No
- Do you pass segment 3 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating sub-assembly
 - ☐ Creating Mates
 - ☐ Moving Parts
 - ☐ Creating Coordinate
 - ☐ Modifying Advanced Mates
 - ☐ Part Creation

E N D o f E X A M S E T N o . 3

4.5 Practice Exam Set 4

Exam Set 4 [Segment 3]

Certified SolidWorks Professional CSWP Segment 3 Test



- Segment 3 Assemblies
 - Creating Probe part
 - Add part to assembly
 - Insert sub-assembly
 - Modify mates
 - Collision/Interference
 - Replace part
- Test duration: 80 min
- Total points: 190 points
- Total Questions: 13
- Pass score: 140

[Start Examination>](#)

Question 1 of 13

EXAM SET 4

This test is made up of a series of problems broken into sets of questions. Each problem set of questions is preceded by a description that outlines the problems to be solved for that set

- Your exam is 13 questions
- You are allowed to answer the questions in any order you prefer
- Use the Summary section to see the list of all questions you have or have not answered
- Once you click end test, you will not be able to return to your questions
- You will have 80 minutes to complete this examination
- Minimum passing score is 140

Press **Start** Examination button to continue.

[Start](#)**Question 1.****Part Configuration Problem Set Description**

You will be creating an assembly of a robotic arm starting with the base. Some parts will be modeled by you and others will be supplied to you. You will be asked to do the following:

- Modeling of individual parts correctly
- Assembling and mating parts into assembly
- Interference detection
- Mate modification
- Part replacement

* Note: The images shown are not to scale due to differences in the parts being downloaded for each tester.

Please select **continue** to the next question.

[Continue](#)

Question 2 of 13

EXAM SET 4

For 20 points

Create Base

Build this part in SolidWorks

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

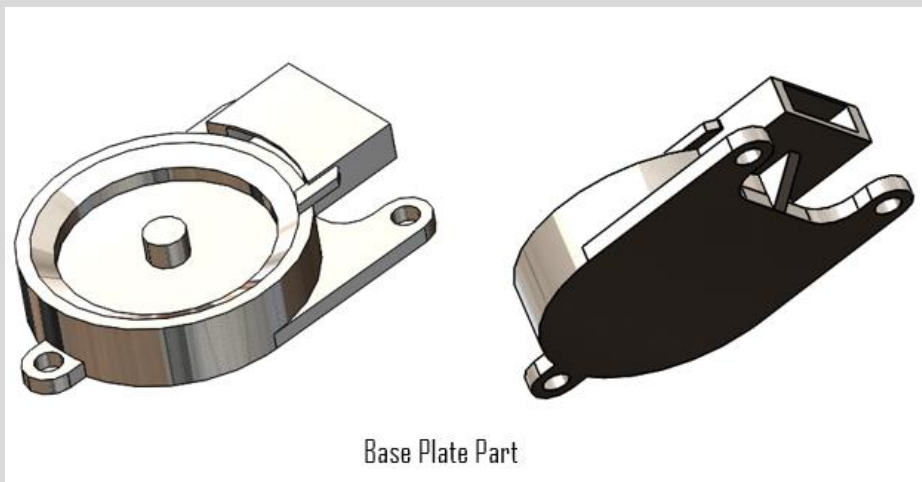
Material: AISI1020

Density: 7900kg/m³

Part origin: Arbitrary

All holes through all unless shown otherwise.

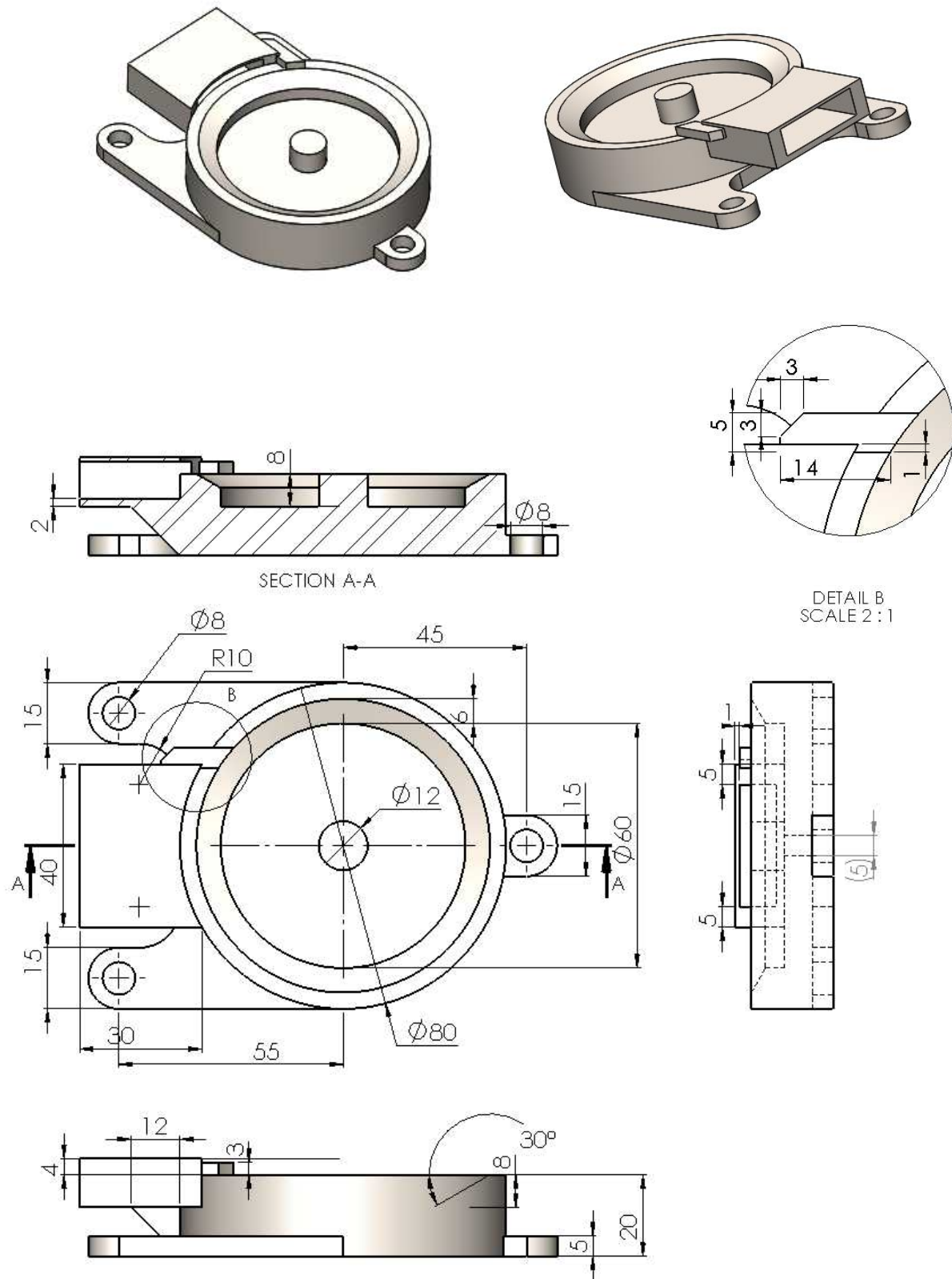
What is the overall mass of the part (kg)?

☐ 710.15☐ 725.63☐ 721.72☐ 715.23

* Refer to following drawing images to create base plate part

Next Question >

Reference Image for Q2 of Exam Set 4 >>



Question 3 of 13

EXAM SET 4

For 10 points

Create Assembly from the Base

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Part Origin: Arbitrary

-Insert the Base Plate created in the last problem into an assembly

* Note: this assembly will be referred to as the main assembly

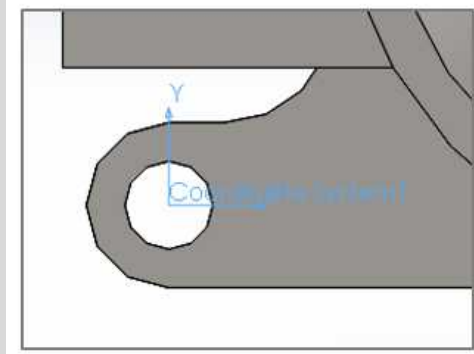
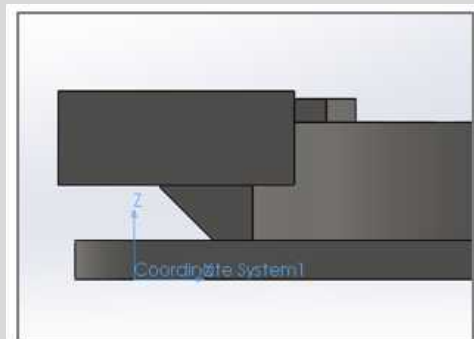
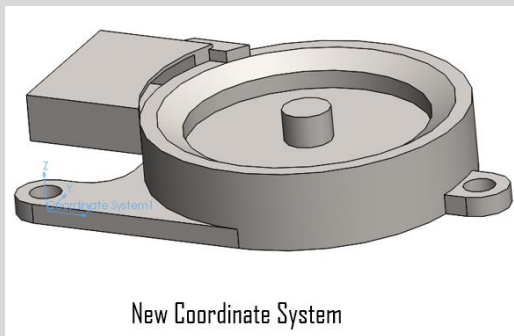
-Create a coordinate system at the location and orientation shown in the first image.

* Note: This coordinate system will be used throughout the problem set

-Using the create coordinate system as the output coordinate system, measure the center of gravity of the assembly

What is the center of gravity of the assembly (mm)?

Enter value: [X= Y= Z=]



Next Question >

Question 4 of 13

EXAM SET 4

For 15 points

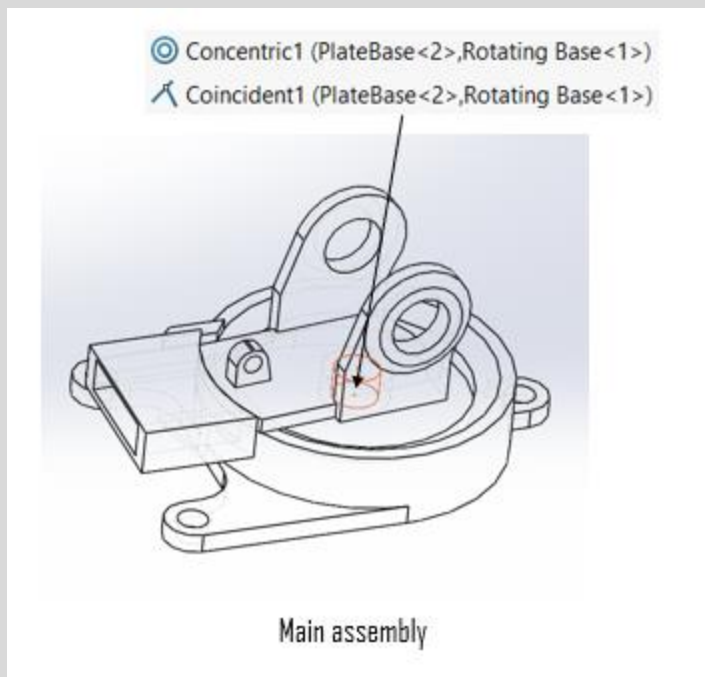
Add a part to main assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Open the attached part '**Rotating Base**'.
- Insert the rotating base part into the assembly that contains the base plate.
- Position the part with respect to the base as shown. Create all the necessary mates.
- Using the coordinate system created earlier as the output coordinate system. Measure the overall mass of the assembly.

What is the mass the assembly (grams)?

Enter value: []

Next Question >

Question 5 of 13

EXAM SET 4

For 10 points

Adding Part into Main Assembly

Unit system: MMGS (millimeter, gram, sec)

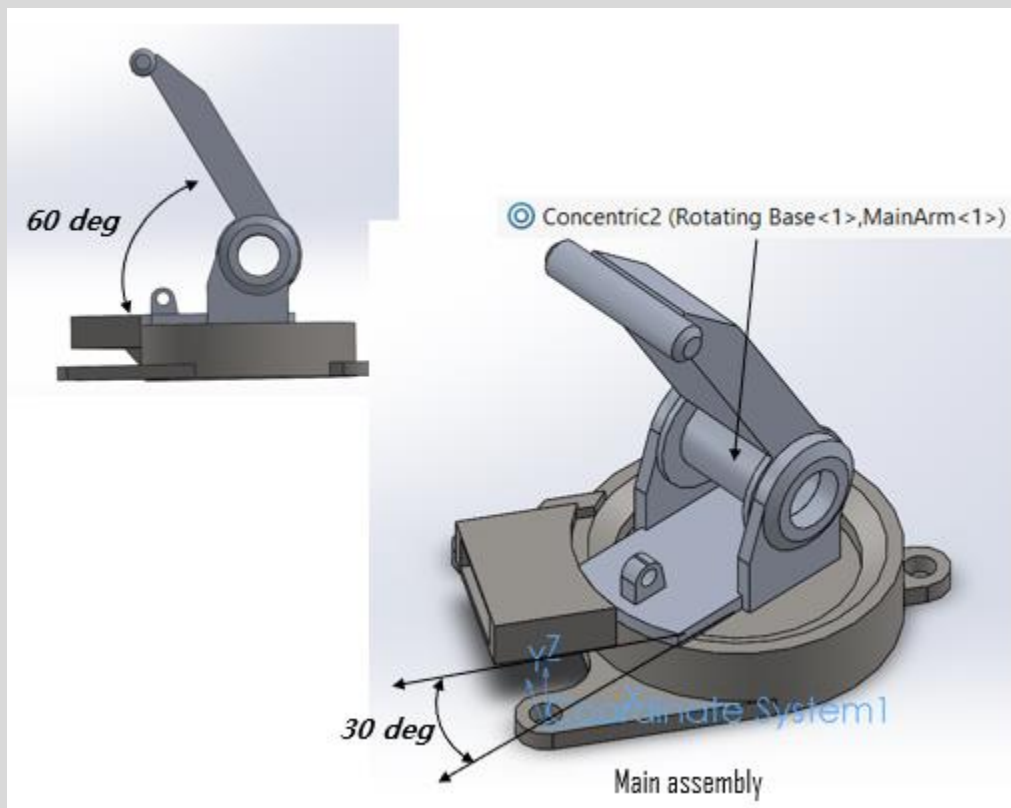
Decimal places: 2

- Open the attached part 'Main Arm' and add to the Main assembly
- Created necessary mates following the position and orientation as shown in image.

-Using the create coordinate system as the output coordinate system, measure the center of gravity of the assembly

What is the center of gravity of the assembly(mm)?

Enter value: [X= Y= Z=]



Next Question >

Question 6 of 13

EXAM SET 4

For 10 points

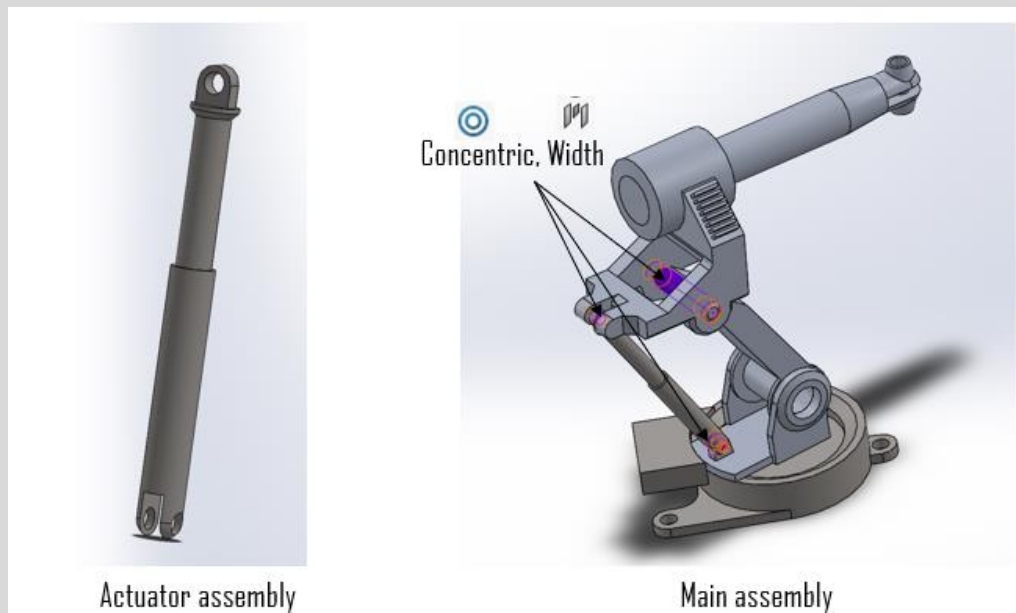
Create actuator assembly and Insert it into main assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Create actuator assembly using actuator housing and actuator piston parts.
- Insert 'Actuator' assembly and 'SubArm' part into main assembly as shown in image.
- * Note: Modify any previously placed mates if necessary
- * Note: Set the sub-assembly as 'Flexible' to make proper mates with components in main assembly.
- Measure the overall mass of the assembly.

What is the mass the assembly(grams)?

Enter value: []

Next Question >

Question 7 of 13

EXAM SET 4

For 20 points

Collision Detection

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Modify the mate associated with Base Plate to rotate freely described in image.

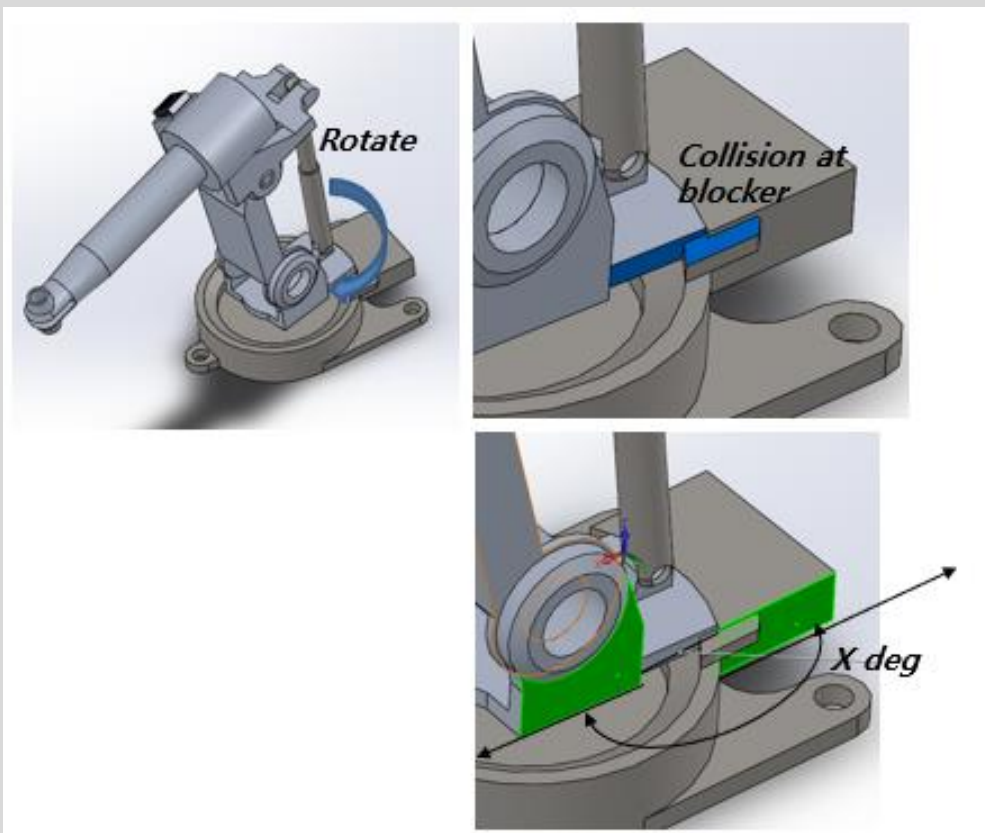
* Note: Modify or delete any previously placed mates if necessary

-With collision detection turned on (stop at collision 'ON'), Rotate the rotating plate in clockwise direction as shown in the image until collision detect.

Measure the angle, X, indicated in the image. (between 90~180 degree)

What's the measured angle, X (degree)?

Enter value: []

[Next Question >](#)

Question 8 of 13

EXAM SET 4

For 20 points

Add mates

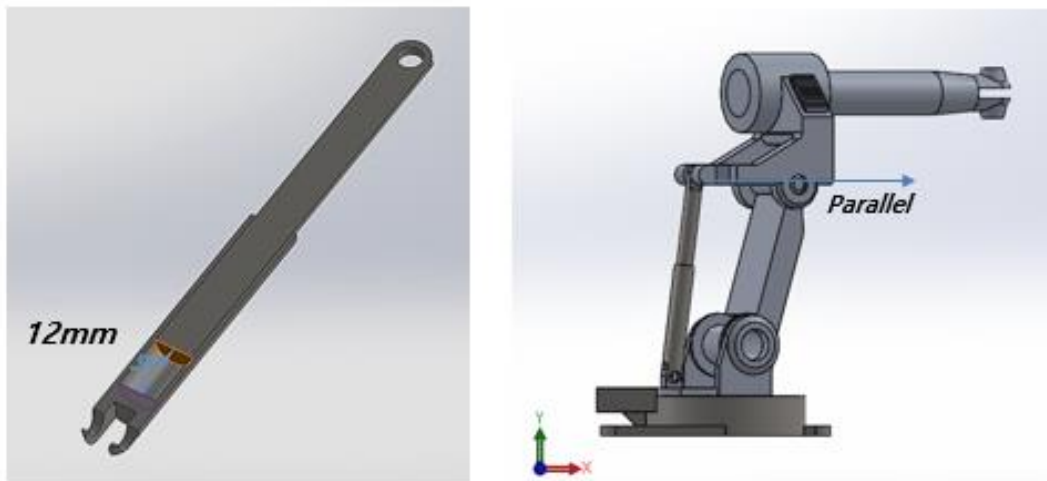
Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Add distance mate (12mm) in the actuator assembly as shown below.
- Add parallel mate in sub arm part (see image)
- Unsuppressed angle mate (30deg) between base plate and rotating plate defined in Q5.
- * Note: Modify or delete any previously placed mates if necessary
- Using the create coordinate system as the output coordinate system, measure the center of gravity of the assembly

What is the center of gravity of the assembly (mm)?

Enter value: [X= Y= Z=]



Additional mates

Next Question >

Question 9 of 13

EXAM SET 4

For 20 points

Interference Checking in the main assembly

Unit system: MMGS (millimeter, gram, sec)

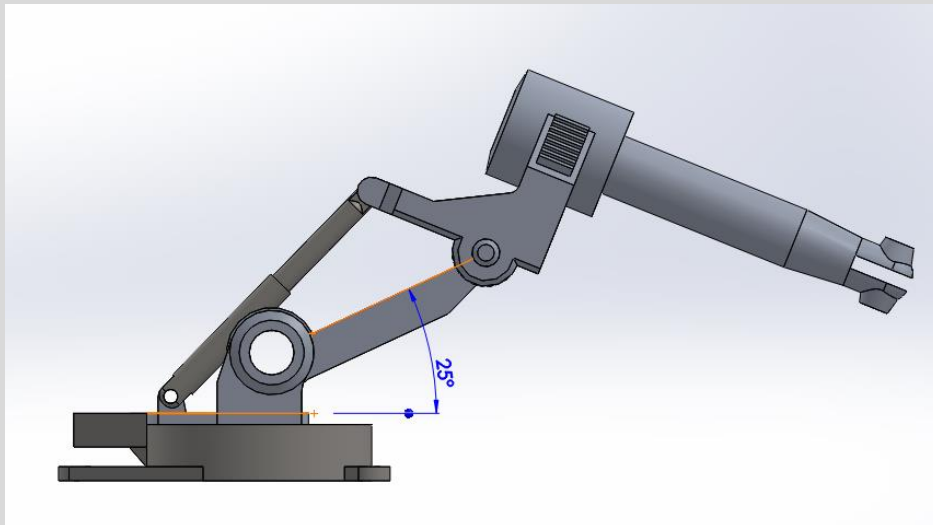
Decimal places: 2

- Suppress parallel mate on Sub Arm assigned in Q8
- Add angle mate (25 deg) between Main Arm and Rotating Plate as shown in image.
- Perform an interference Detection check on the main assembly while turning on the following options

- Treat subassembly as components
- Make interference parts transparent

*Note: All other interference detection options will be unchecked (OFF)

Select all the components that are found to cause interferences or No interferences detected if no interference are found

Name of the components: []

Next Question >

Question 10 of 13

EXAM SET 4

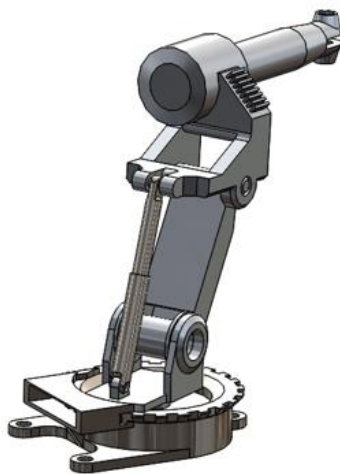
For 10 points

Replace Part

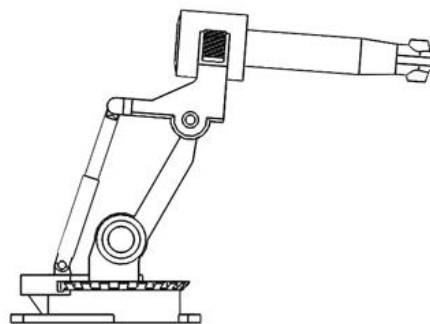
Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

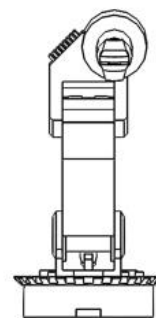
- Replace Base Plate (New design) with existing one and modify the necessary mates as shown in image.
 - Measure the overall mass of the assembly.
- What is the mass the assembly (grams)?

Enter value: []

Main assembly (after replacement)



Side view



Front view

[Next Question >](#)

Question 11 of 13

EXAM SET 4

For 20 points

Create New Coordinate System and Modify Mates

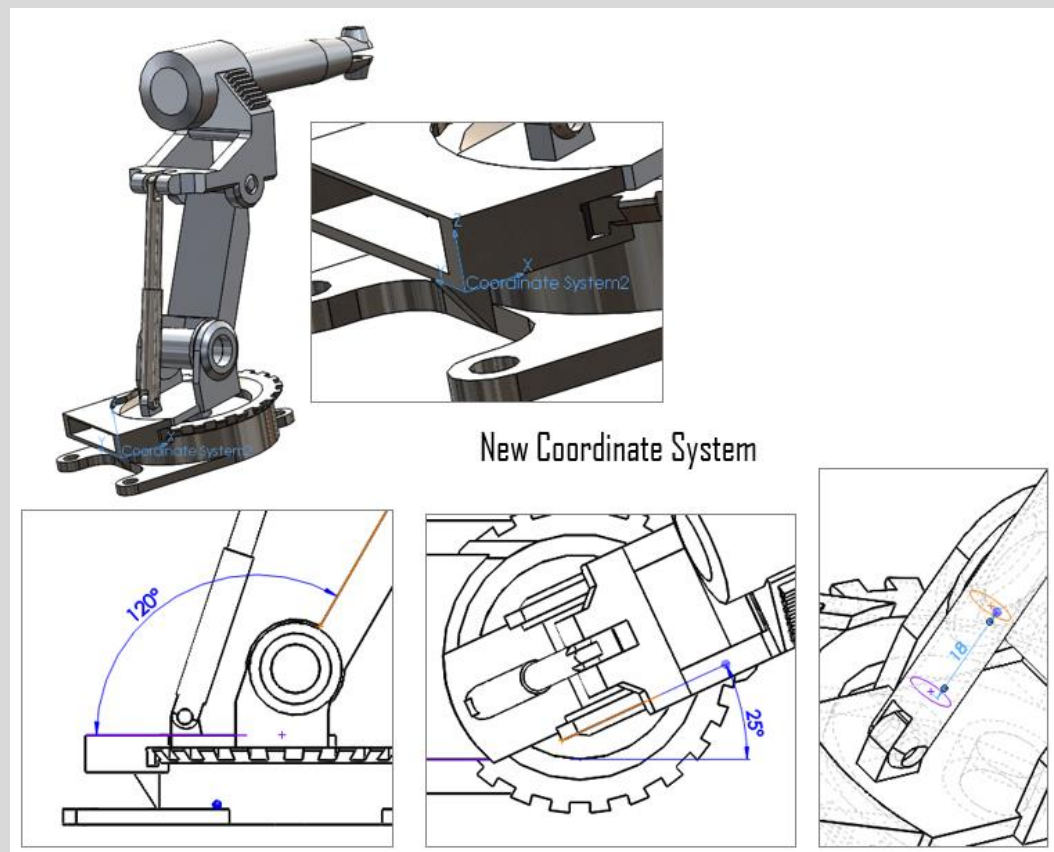
Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Create new coordinate system following position and orientation as shown in image.
- Modify the necessary mates to comply with the configuration shown in image.
- Using the create coordinate system as the output coordinate system, measure the center of gravity of the assembly

What is the center of gravity of the assembly(mm)?

Enter value: [X= Y= Z=]



Next Question >

Question 12 of 13

EXAM SET 4

For 20 points

Create a part and add to main assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

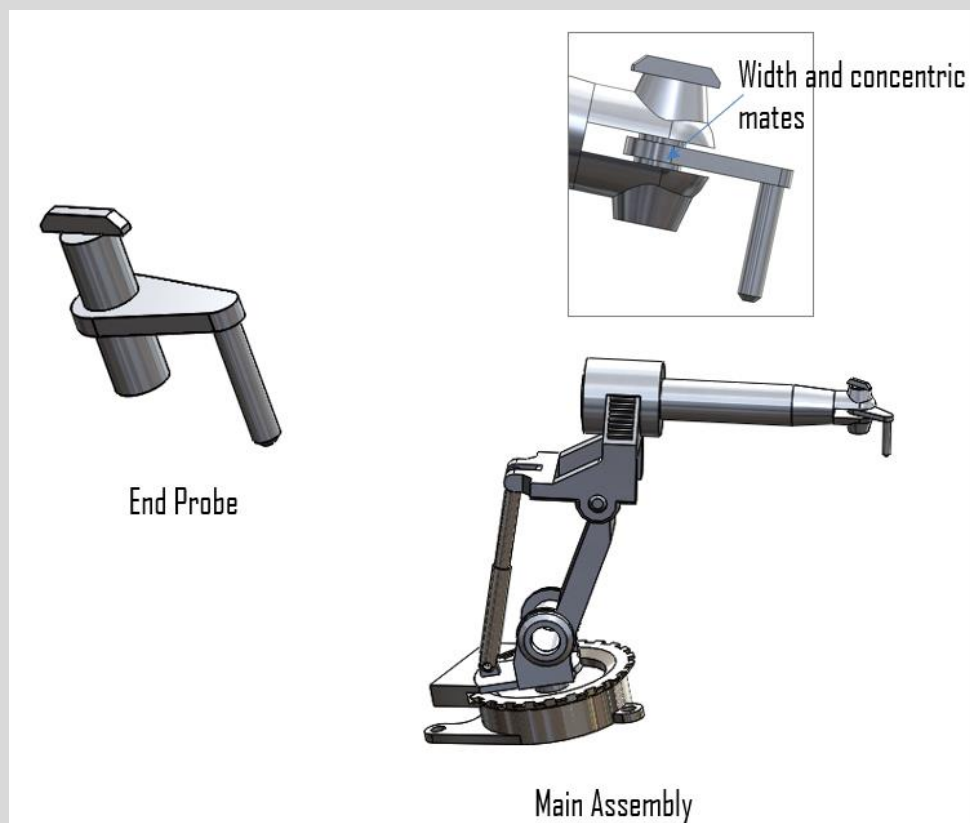
Material: 1060 Alloy

-Create new component based on the provided drawing.

-Add it to main assembly and measure the total mass.

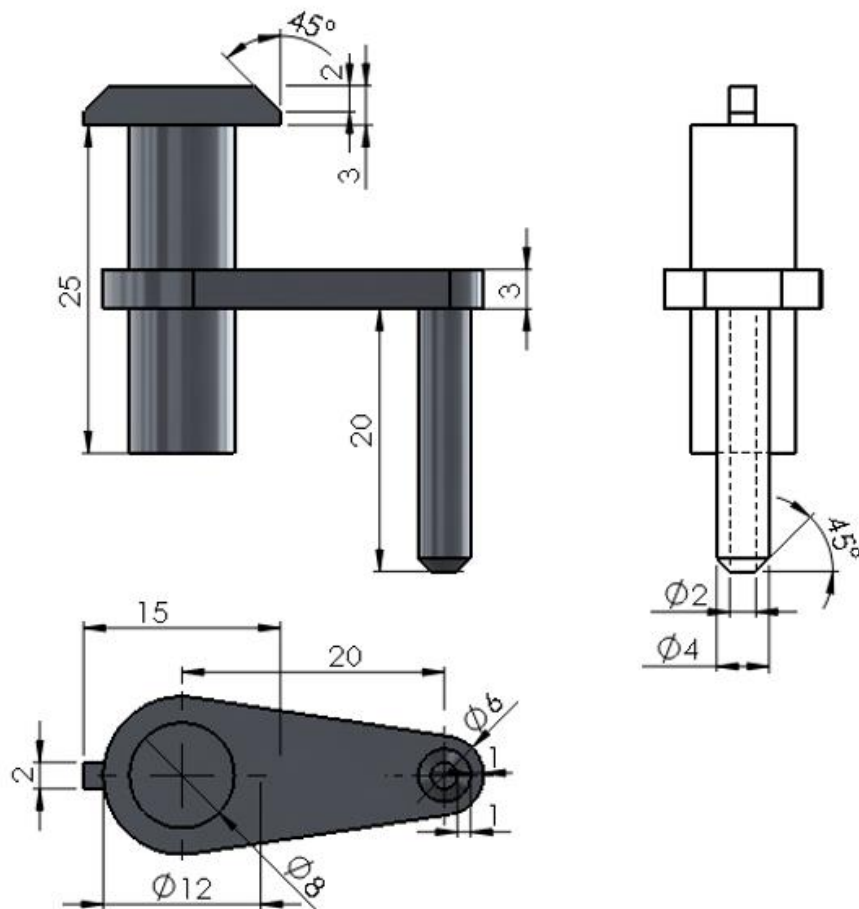
- Measure the overall mass of the assembly.

What is the mass the assembly (grams)?

Enter value: []

Next Question >

Reference Image for Q12 of Exam Set 4 >>



Question 13 of 13

EXAM SET 4

For 15 points

Modify the mates and find the location.

Unit system: MMGS (millimeter, gram, sec)

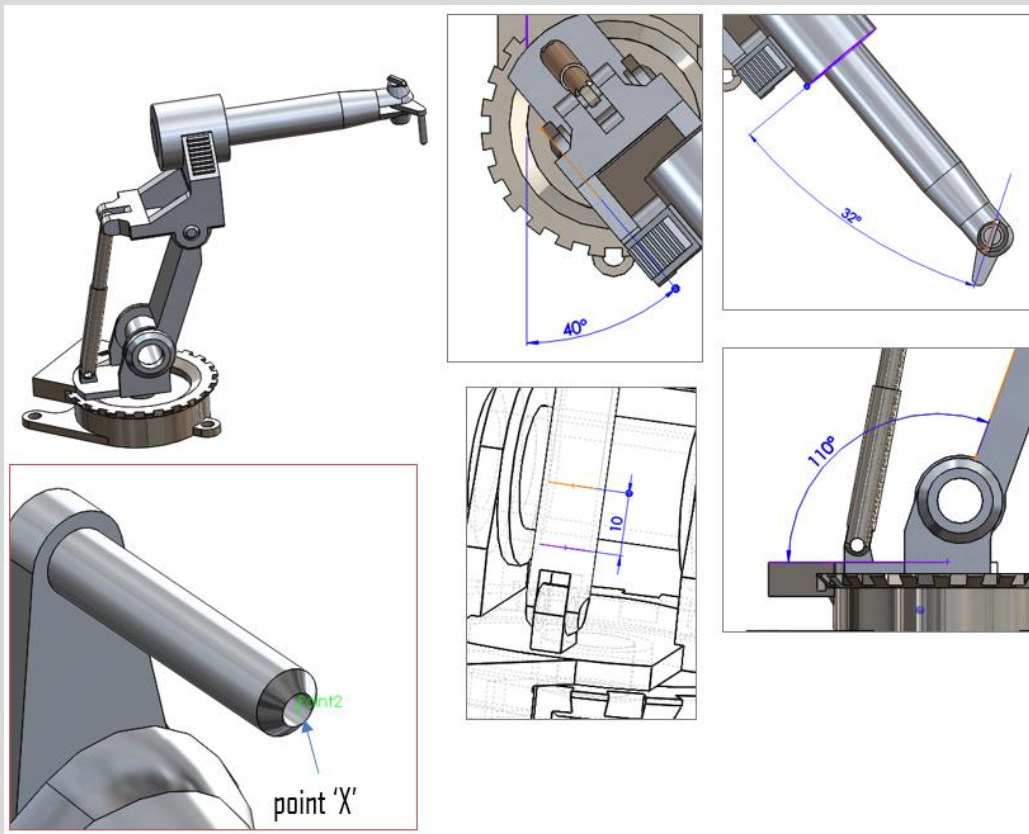
Decimal places: 2

- Modify any previously placed mates following position and orientation shown in the image
- Using the created coordinate system in Q11 as the output coordinate system.
- Measure the location 'X' (the center point of the end probe tip).

Hint: Create point at the center of the tip to measure exact position.

What's the coordinate of point 'X' relative to the coordinate system created in Q11.
(x,y,z in mm)?

Enter value: [X= Y= Z=]



Next Question >

Answer Sheet

EXAM SET 4

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Information	0	-
2	Create a part	20	☐ 710.15
3	Create coordinate system	10	X = 49.05, Y = 32.55, Z = 8.26
4	Add part to assembly	15	757.79
5	Add part to assembly	10	X = 48.83, Y = 31.98, Z = 14.62
6	Create sub-assembly	10	1198.48
7	Collision detection	20	177.59
8	Add mates	20	X = 63.20, Y = 42.78, Z = 59.25
9	Interference check	20	Main arm, Act housing
10	Replace part	10	1435.85
11	Modify coordinate	20	X = 70.00, Y = 40.47, Z = 34.00
12	Create part & add to assembly	20	1441.60
13	Modify the mates	15	X = 193.44, Y = 143.69, Z = 140.93
	Total	190	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here while **Fill-in-blank** type answer should be within $\pm 1\%$ of provided answers.

Review

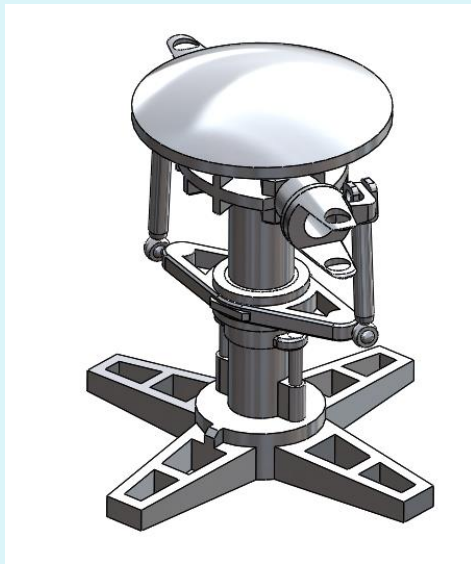
- What's your score?
- Do you finish segment 3 test within 80 minutes? ☐ Yes ☐ No
- Do you pass segment 3 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating sub-assembly
 - ☐ Creating Mates
 - ☐ Moving Parts
 - ☐ Creating Coordinate
 - ☐ Modifying Advanced Mates
 - ☐ Part Creation

E N D o f E X A M S E T N o . 4

4.6 Practice Exam Set 6 (Revised format)

Exam Set 5 [Segment 3]

Certified SolidWorks Professional CSWP Segment 3 Test



- Segment 3 Assemblies
 - Creating Probe part
 - Add part to assembly
 - Insert sub-assembly
 - Modify mates
 - Collision/Interference
 - Replace part
- Test duration: 80 min
- Total points: 109 points
- Total Questions: 14
- Pass score: 77 points

[Start Examination>](#)

Examination Information

Welcome to the CSWP Segment 3 Core Exam (CSWPCORE)

As per the Candidate Conduct Policy you have agreed to, all models you submit in response to the questions in this SOLIDWORKS Certification exam will be your original work, and you did not reuse any models from a social website or other website. Also, all answers you submit in the SOLIDWORKS Certification exam are your own and you will not obtain any answer from a third party source.

- Your exam is: **14 questions**.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have **80 minutes** to complete this examination.
- Minimum passing score is: **77 points**.
- Your proctor is: Virtual Tester Online

Press the Start Examination button to continue

Start Examination >>

Question 1 of 14

For 5 points

This test describes the problem set that must be solved in this problem set. Please read this in its entirety before proceeding and click Yes for 5 points.

Please note that the use of other test taker's completed models and assemblies can lead to the annulment of your results per the Candidate Conduct Policy you agreed to.

You will be creating an assembly of a 3D printing machine starting with the frame. All the parts will be given to you.

You will be asked to do the following:

- Start and assembly
- Insert initial part into an assembly
- Assemble and mate part into an assembly
- Create and insert subassemblies
- Interference detection
- Create coordinate system and measure center of mass

Download the attachment file and click Yes to start next question

Attachment to this question

 Set5_MainShaft.SLDPRT

☒ Yes

Next question >>

Question 2 of 14

For 8 points

Create main assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: Arbitrary

Insert the part called 'MainShaft' into a new assembly and fix the position of the frame

Accepting default position.

-Save the assembly with the name 'Main'

-Create a coordinate system at the corner of the main shaft as shown in following image and rename it 'CS_1'

*Note: This coordinate system will be used throughout this problem set until new one is created.

- Measure the center of Mass of the assembly relative to the coordinate system CS_1

What is the Center of Mass (mm)?

☐ X=16.14, Y=132.54, Z=160.53

☐ X=0, Y=0, Z=0

☐ X=17.39, Y=159.97, Z=170.93

☐ X=15.34, Y=132.87, Z=16.43

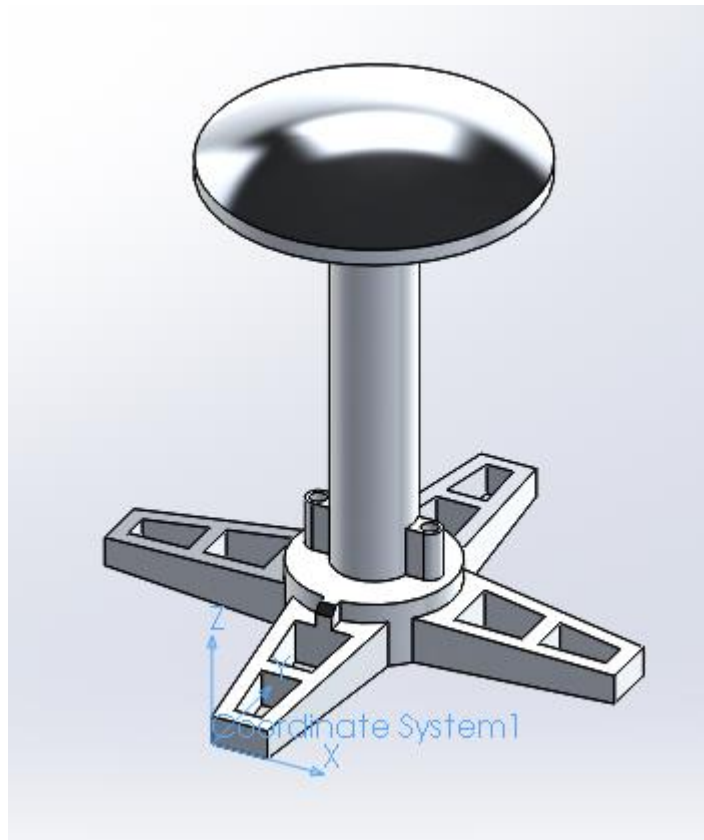
Attachment to this question



Set5_MainShaft.SLDPRT

[Next question >>](#)

Reference Image for Q2 of Exam Set 5 >>



Question 3 of 14

For 8 points

Insert a component into main assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Insert Rotor hub component into main assembly

-Position the Rotor hub component with respect to the frame component as shown in the following image. Create all the necessary mates.

-Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

Y=

Z=

(Use . (Point) as decimal separation)

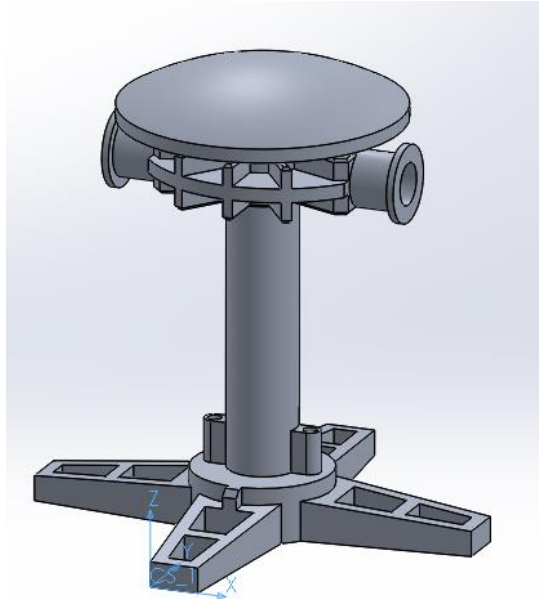
Attachment to this question



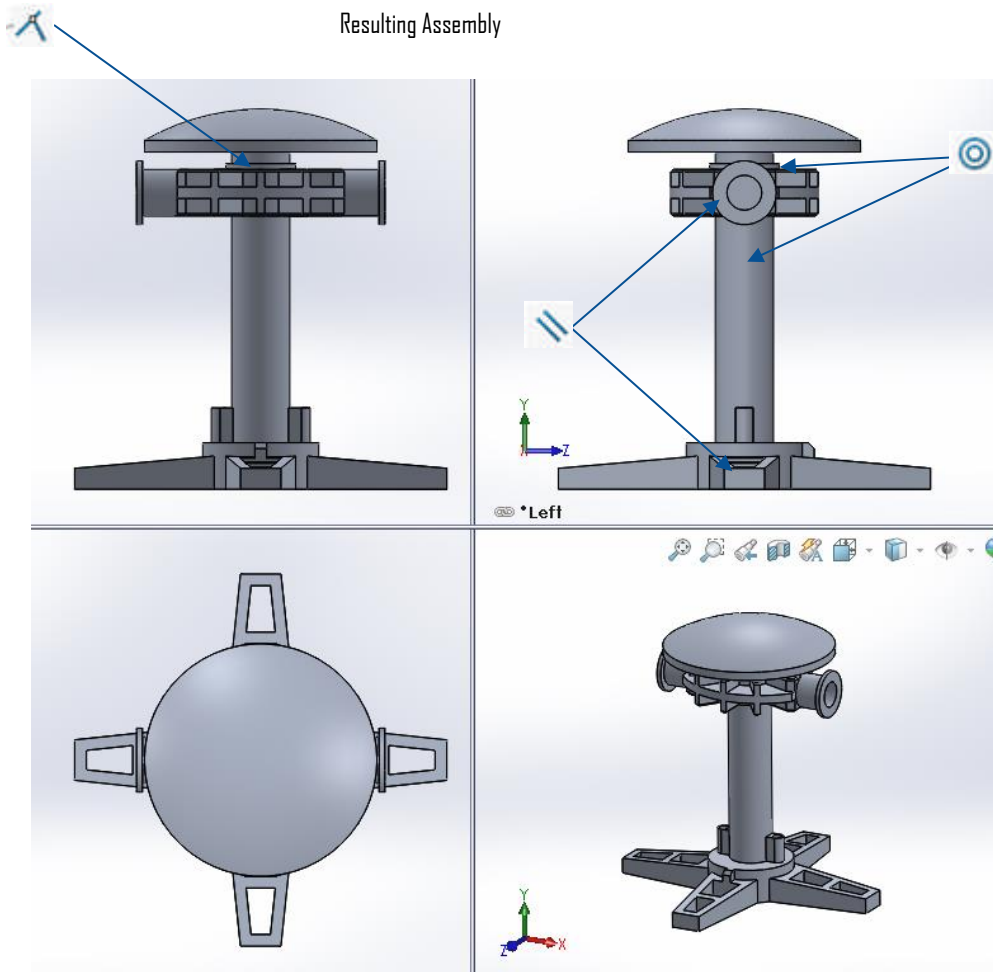
Set5_RotorHub.SLDPRT

[Next question >>](#)

Reference Image for Q3 of Exam Set 5 >>



Resulting Assembly



Assembly with mates

Question 4 of 14

For 8 points

Insert parts into main assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Open the attached parts '**Ball Joint**' and '**Pushrod_70**'
- Insert the Ball Joint and two Pushrods into the assembly that contains the main shaft.
- Position the pushrod with respect to the main shaft surface as shown in image. Create all the necessary mates.
- Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

Y=

Z=

(Use . (Point) as decimal separation)

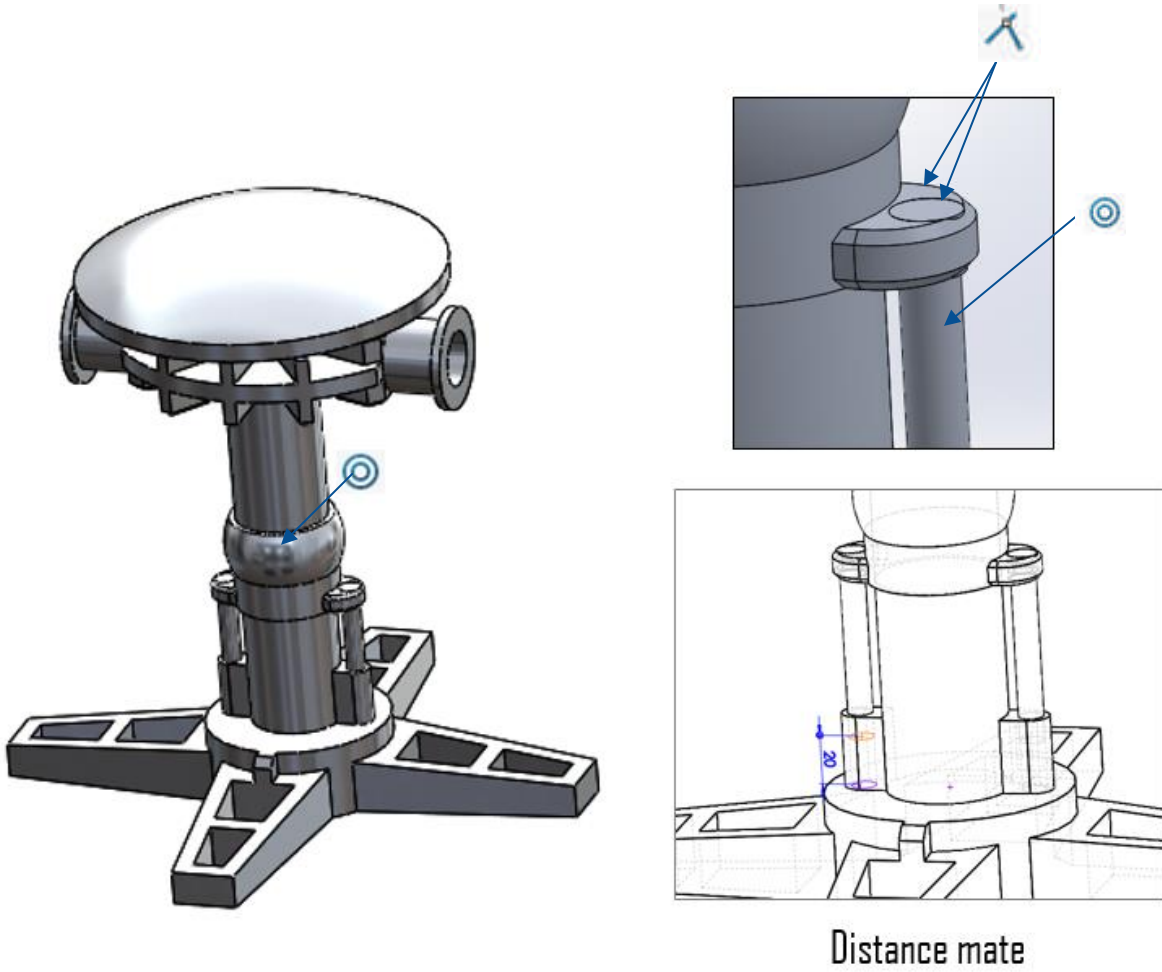
Attachment to this question



Set5_BallJoint.SLDASM, Set5_PushRod_70.SLDPRT

[Next question >>](#)

Reference Image for Q4 of Exam Set 5 >>



Question 5 of 14

For 8 points

Create Linkage assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Open the attached part '**Link**' and '**Rod End**' to create assembly.

* Note: This assembly will be referred to as the Linkage Assembly.

- Save as 'Linkage.SLDASM'

- Measure the mass of the Actuator Assembly.

What's the overall mass of the assembly (kg)?

Enter values

(Use . (Point) as decimal separation)

Attachment to this question



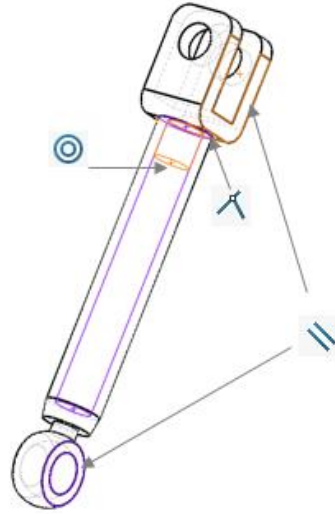
Set5_Link.SLDPRT, Set5_RodEnd.SLDPRT

[Next question >>](#)

Reference Image for Q5 of Exam Set 5 >>



Linkage assembly



Assembly with mates

Question 6 of 14

For 8 points

Insert sub-assembly into main assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_1

- Insert two of '**Blade Grip**' into main assembly as shown in image.
- Insert two of '**Linkage Assembly**' into main assembly and create necessary mates (see image)
- * Note: The orientations of both blade grips are not symmetrical.
- Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination X=
 Y=
 Z=

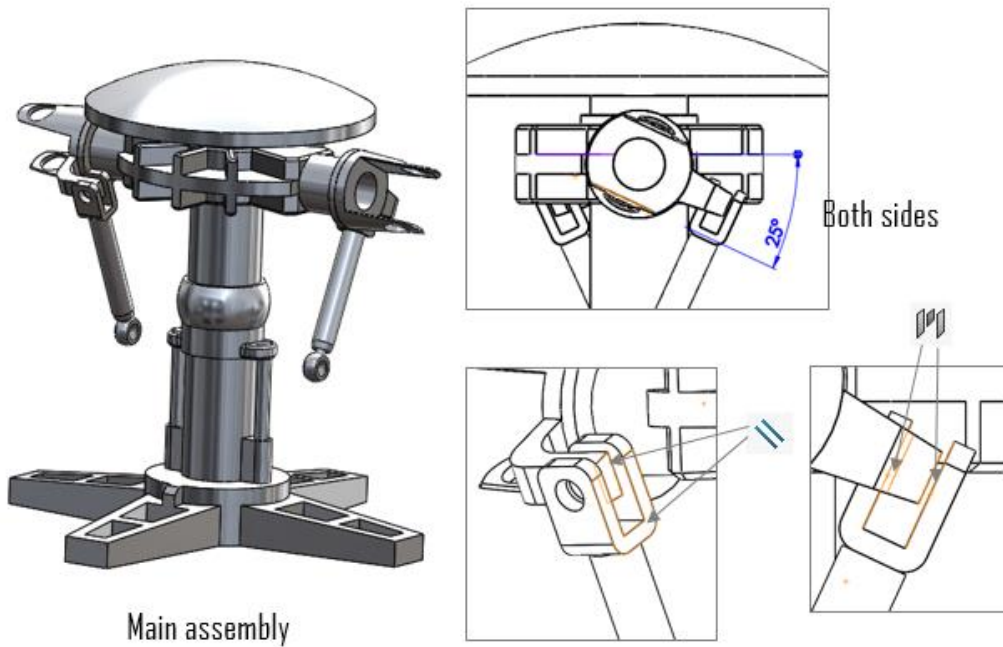
(Use . (Point) as decimal separation)

Attachment to this question

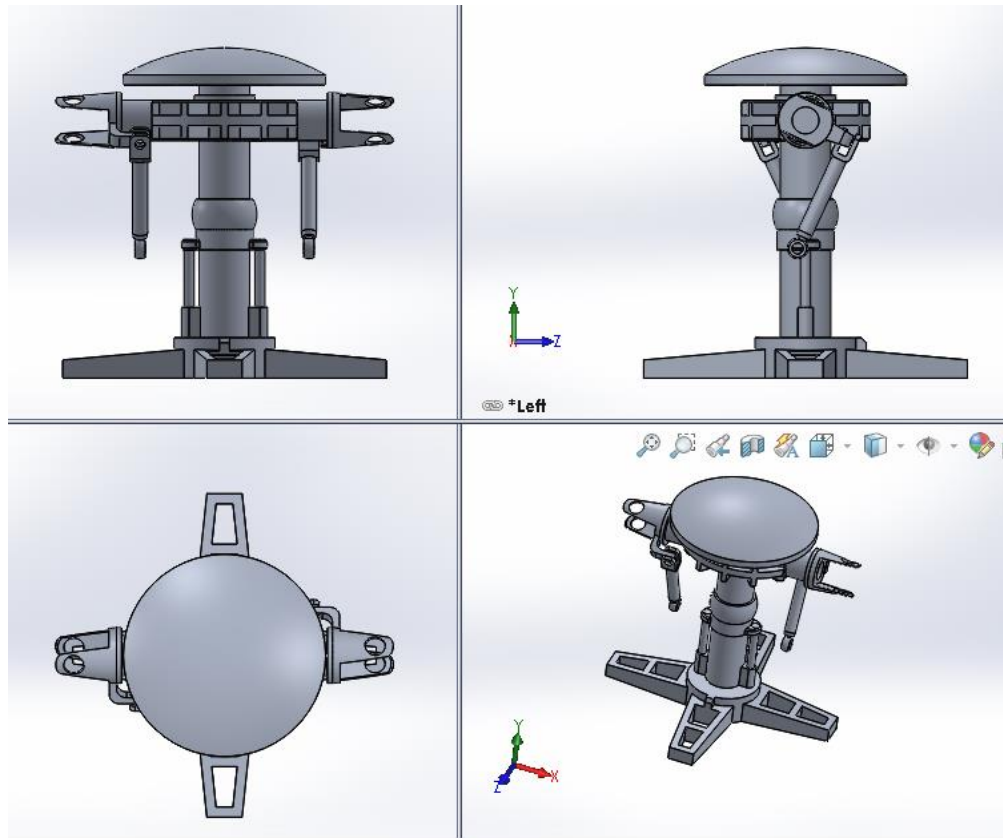
 Set5_BladeGrip.SLDPRT

Next question >>

Reference Image for Q6 of Exam Set 5 >>



Assembly with mates



Question 7 of 14

For 8 points

Collision detection

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_1

-Insert '**Swish plate**' into main assembly as shown in image.

* Note: Modify or delete any previously placed mates if necessary.

Swish plate will not rotate with respect to shaft axis.

- Modify the mates of the **Rotor Hub** to rotate freely described in image.

- Modify the mates of the Blade Grips and Linkage assembly so that they rotate freely.

- Remove the distance mate associated with **Pushrod** so that Swish plate can slide up and down.

- Create angle mate (35 degree) as shown in image (next page) and measure the distance 'X' of push rod movement.

Enter values

(Use . (Point) as decimal separation)

Attachment to this question



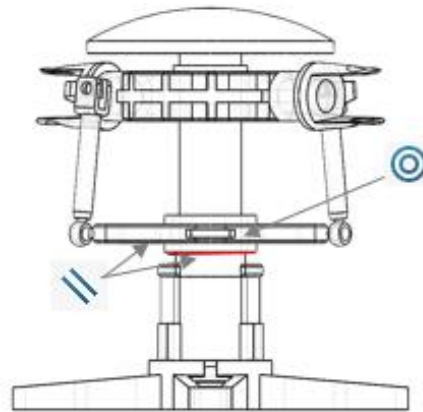
Set5_SwishPlate.SLDPRT

Next question >>

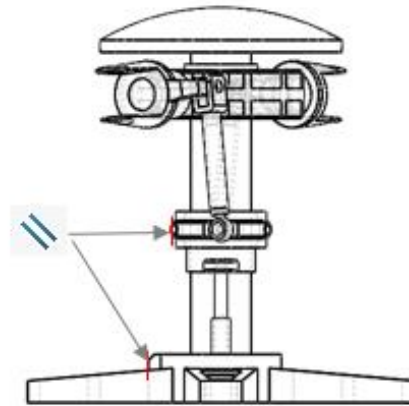
Reference Image for Q7 of Exam Set 5 >>



Main assembly

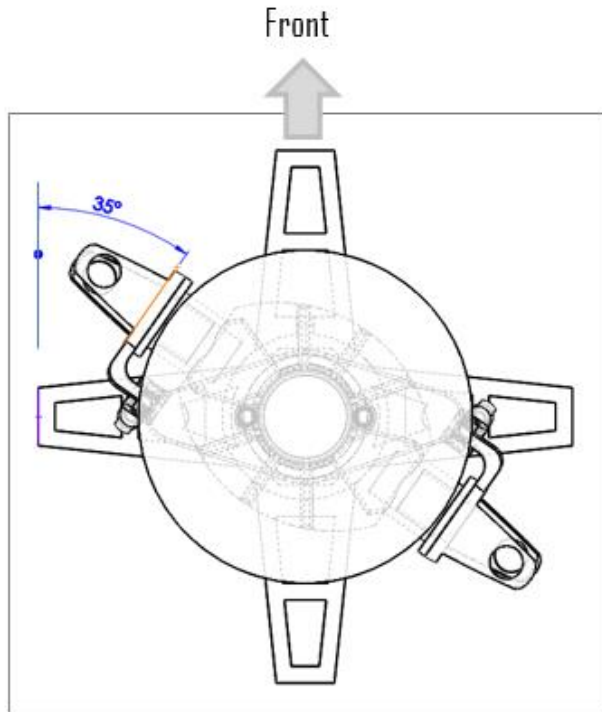


Front view

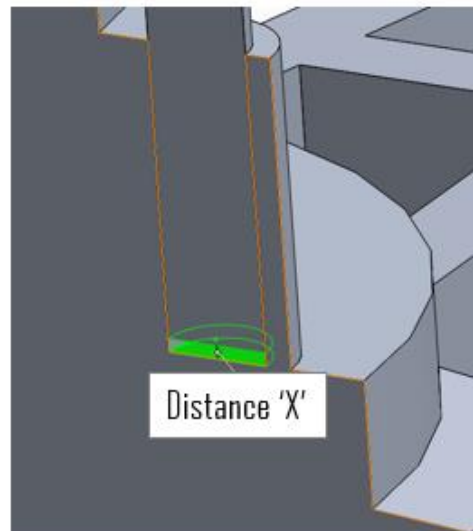
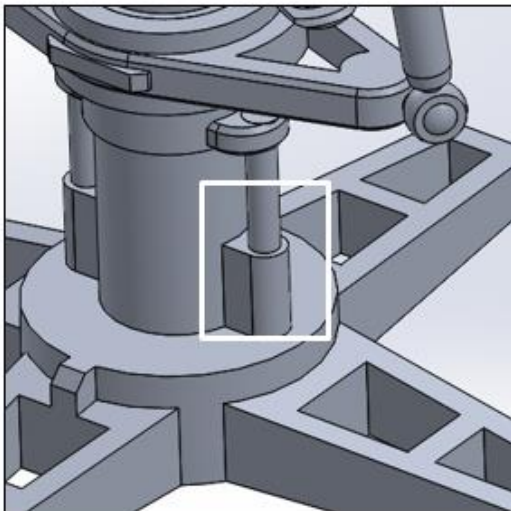


side view

Reference Image for Q7 of Exam Set 5 >>



*Note: Distance mate(20mm) in Q4. should be suppressed to apply this angle mate



Question 8 of 14

For 8 points

Collision Detection.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_1

- Start from the status of the previous assembly
- Reduce the push rod length from 70mm to 50mm and set distance 8mm (see image). This configuration will be referred to as '**Initial condition**'
- Then, suppress this distance mate and angle mate (35 degree) assigned in previous question so that swish plate can move vertically.
- With **collision detection** turned on (stop at collision 'ON'), Move up swish plate as shown in the image until collision detects.
- * Note: Rotor Hub should rotate to counter-clockwise direction during the swish plate is moving up.
- Measure the distance, X, indicated in the image.

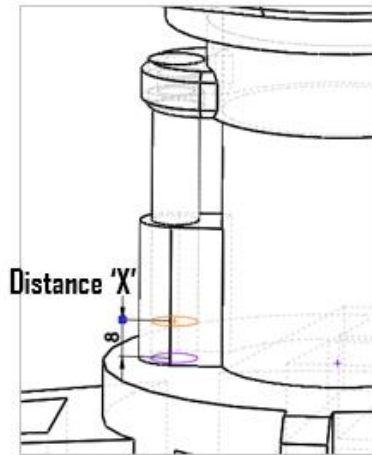
What's the measured distance, X (mm)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Reference Image for Q8 of Exam Set 5 >>



Main Assembly

Definition of distance 'X'

Question 9 of 14

For 8 points

Modify the mates

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_1

- Return to 'Initial Condition' and suppress the distance mate (push rod) so that swish plate can move vertically.

- Add mate associated with blade grip to be parallel with respect to ground

*Note: Modify the previously defined mates if necessary

- Measure the angle 'X' between blade grip axis and axis 'A' (see image)

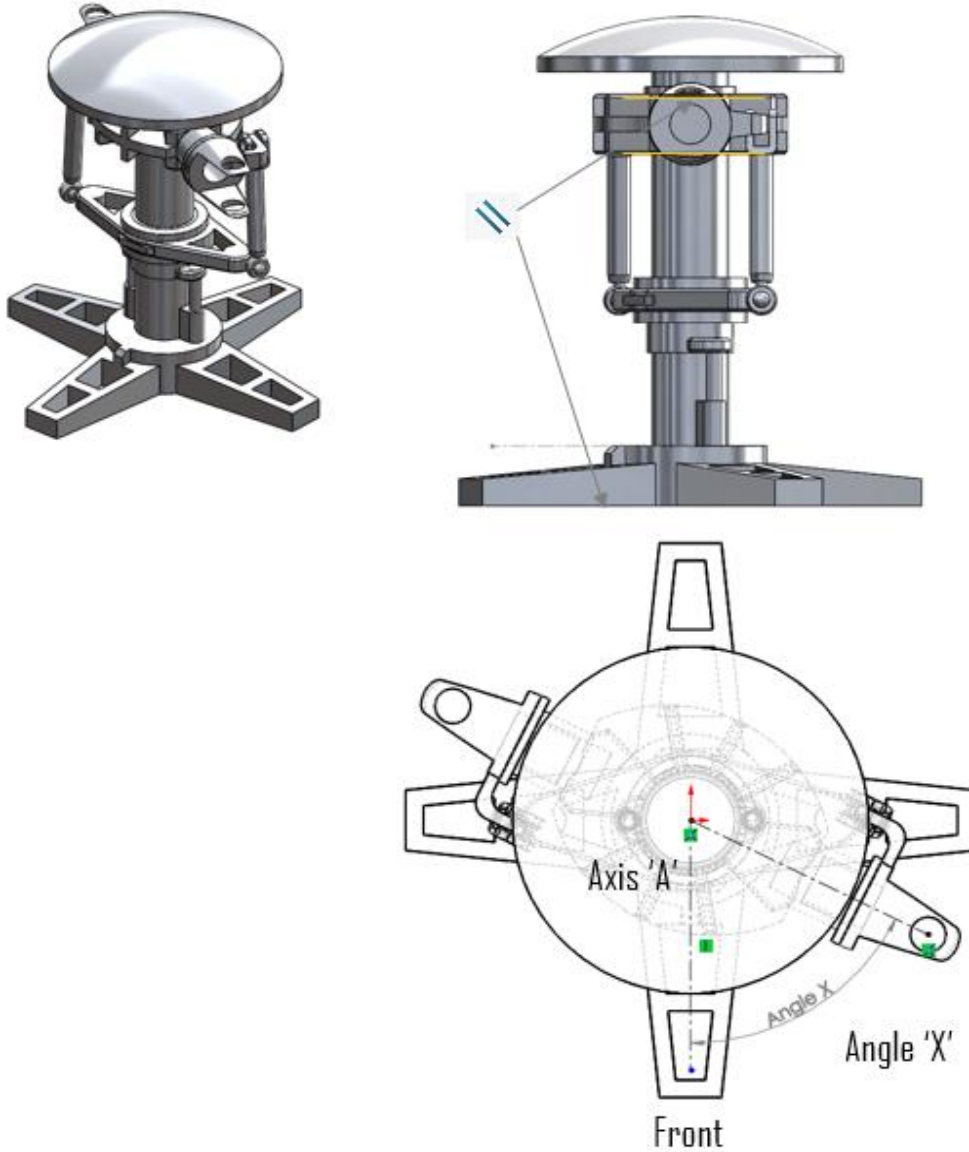
What's the angle 'X'? (Degree)

Enter values

(Use . (Point) as decimal separation)

Next question >>

Reference Image for Q9 of Exam Set 5 >>



Mates with existing components

Question 10 of 14

For 8 points

Replace the part

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Return to the 'initial condition'.

* Note: There will be error during rebuilding. Then, modify the mates of blade Grips so that it can rotate freely.

-Keep the all components with mates of the previous question and start from there.

-Download the attached Rod End (New design) part.

-Replace it with existing part and insert it into main assembly.

-Modify all the necessary mates to comply with the position of the linkage subassembly as directed in the following images

* Note: Other component's position and orientation should comply with the images.

-Measure the Center of Mass of the assembly relative to the coordinate system CS_1.

Enter Coordination

X=

Y=

Z=

(Use . (Point) as decimal separation)

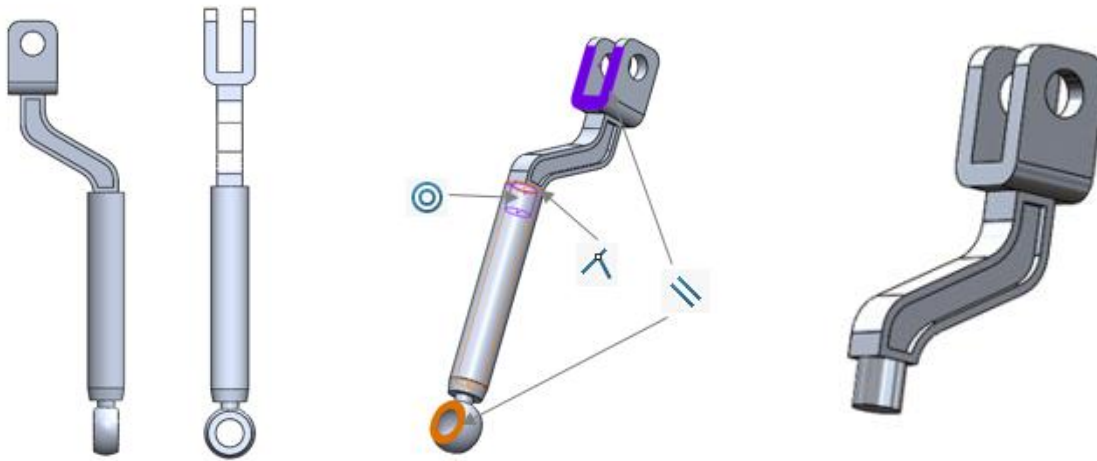
Attachment to this question



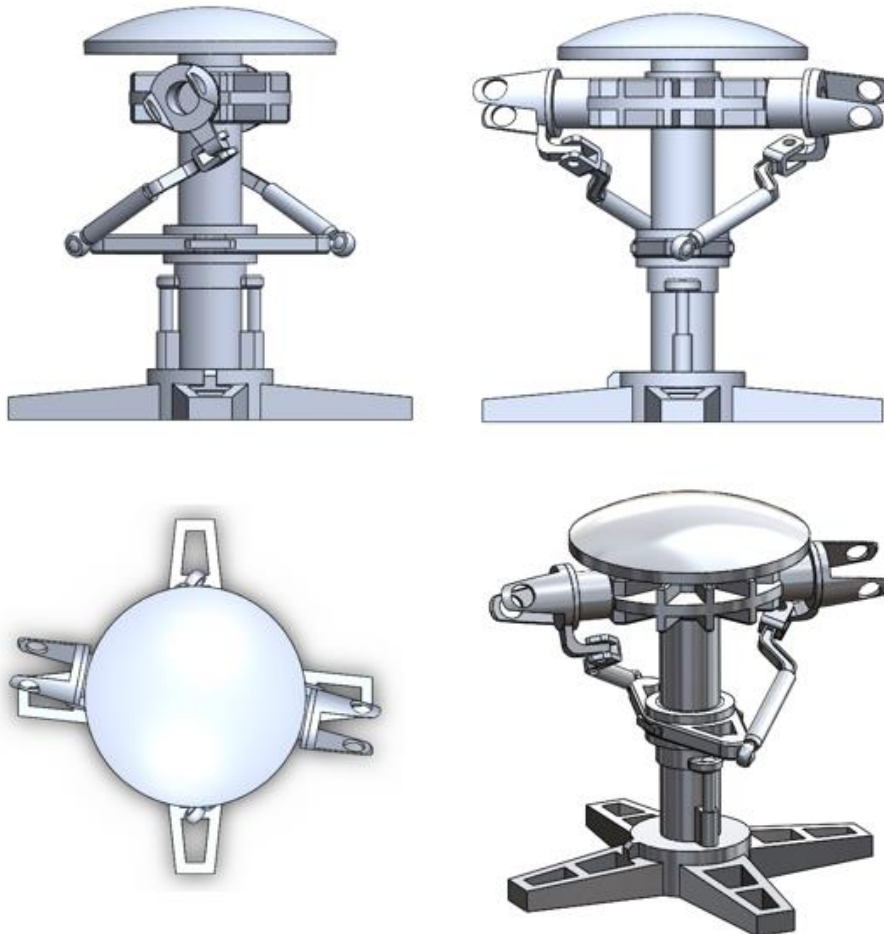
Set5_RodEnd_New.SLDPRT

[Next question >>](#)

Reference Image for Q10 of Exam Set 5 >>



Linkage sub-assembly



Main Assembly

Question 11 of 14

For 10 points

Interference detection

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Change the parameters of the distance mate as shown in the image. Other mates are same as directed in the previous configuration.

- Perform an interference Detection check on the main assembly while turning on the following options

- Treat subassembly as components
- Make interference parts transparent

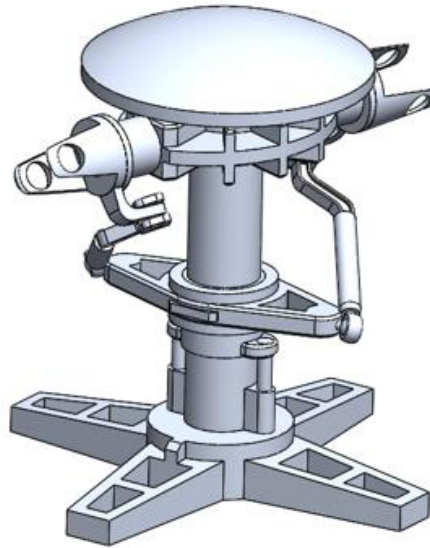
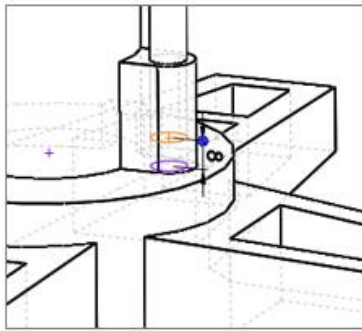
* Note: All other interference detection options will be unchecked (OFF)

Select all the components that are found to cause interferences or No interferences detected if no interference are found

List all components that interference occurs

[Next question >>](#)

Reference Image for Q11 of Exam Set 5 >>



Distance mate setup for interference detection

Question 12 of 14

For 8 points

Create new coordinate system

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

- Create a new coordinate system in the position and orientation shown in the image.
- Name it as 'CS_2' and measure the center of the mass of the assembly relative to the new coordinate 'CS_2'.

What is the center of Mass of the assembly (mm)?

Enter Coordination

X=

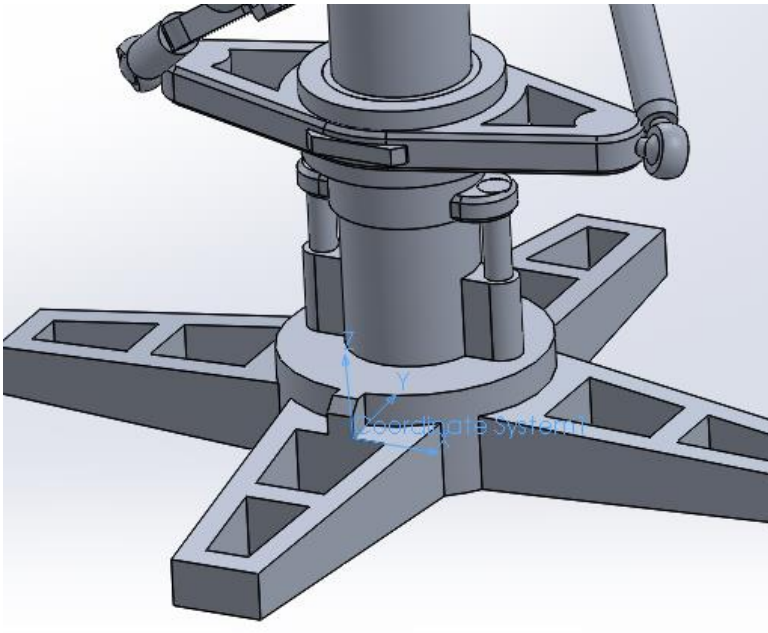
Y=

Z=

(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q12 of Exam Set 5 >>



New coordinate system 'CS_2'

Question 13 of 14

For 8 points

Modify the mates

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_2

-Add angle mates between blade grip and ground as shown below images. Maintain the same mates of the rest of the components as previously directed.

*Note: Suppress the distance mate of the 'Push Rod' to be free in up/down movement of swash plate.

-Set the subassembly as '**Flexible**'

- Measure the center of mass of the main assembly relative to the new coordinate system 'CS_2'.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

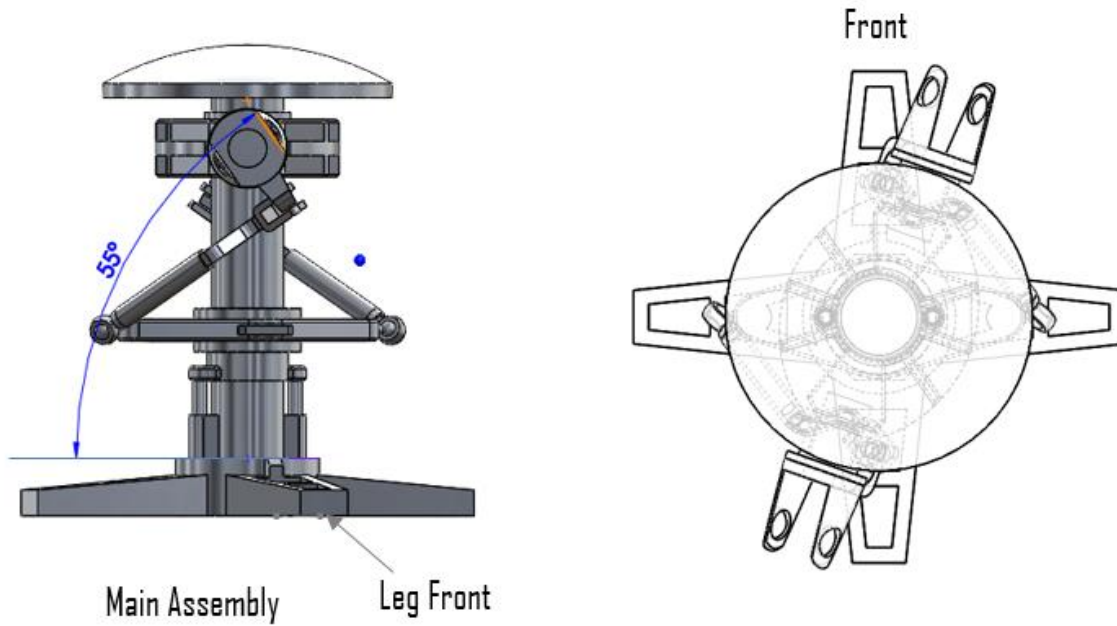
Y=

Z=

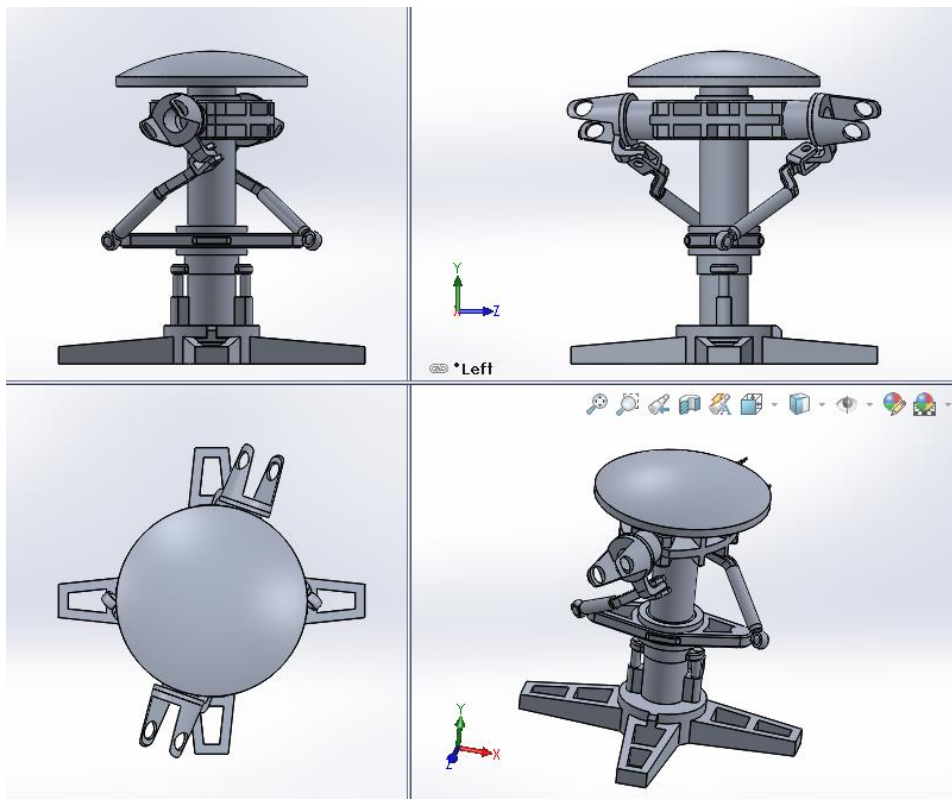
(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q13 of Exam Set 5 >>



Angle mate (55 deg) between blade grip and frame



Question 14 of 14

For 8 points

Find position and measure tool

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_2

-Suppress the angle mate of blade grip assigned in previous question so that swish plate can move vertically.

-The travel distance of push rod is 30mm ranging from bottom to top.

-When pushrod travel from bottom to 50% of travel distance, the rotor hub will rotate due the connecting components.

-Measure the rotated angle (angle X $\rightarrow$ angle X') of rotor hub while the push rod travels from the bottom to 50% of travel distance.

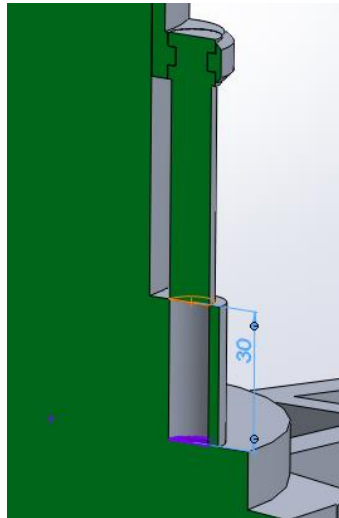
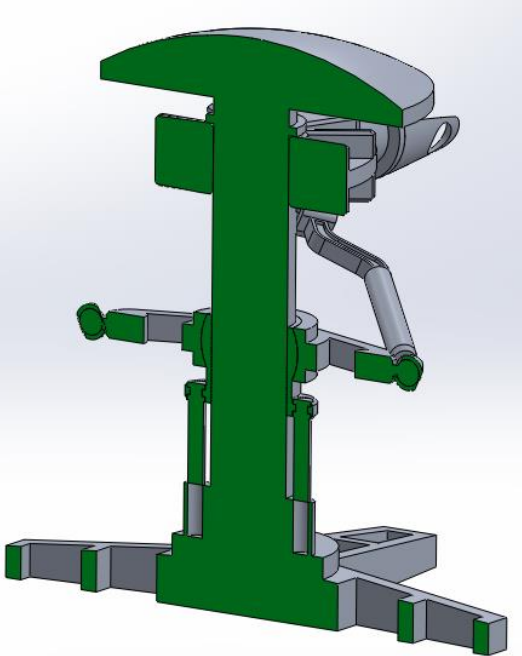
What is the rotated angle of the rotor hub (degree)?

Enter values

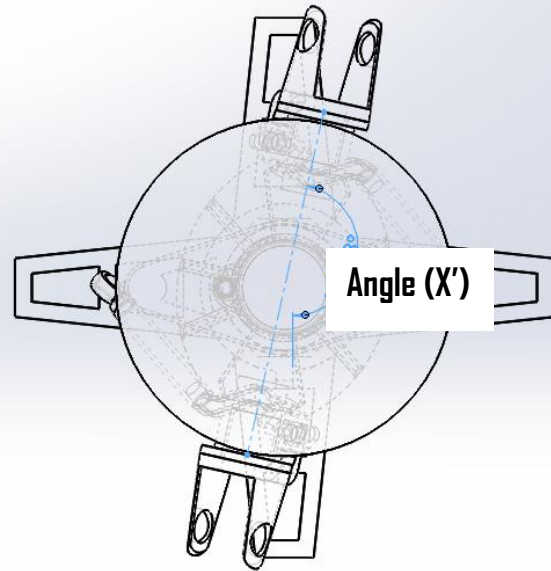
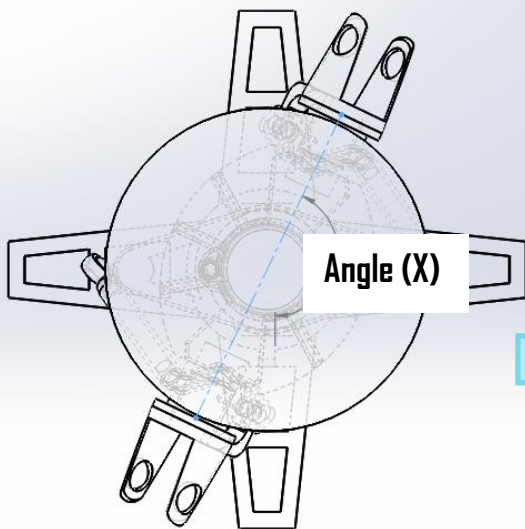
(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q14 of Exam Set 6 >>



Pushrod Travel distance (max 30mm)



Push rods travel from bottom to 50% of max distance

$$\text{Rotated angle} = \text{abs} \mid \text{angle (X')} - \text{angle (X)} \mid$$

Answer Sheet

EXAM SET 6

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Instruction	5	-
2	Create assembly	8	X=17.39, Y=159.97, Z=170.93
3	Insert part to main assembly	8	X = 17.36, Y = 159.97, Z = 183.86
4	Insert parts to main assembly	8	X = 17.36, Y = 159.97, Z = 182.77
5	Create subassembly	8	45.34 grams
6	Insert subassembly	8	X = 17.36, Y = 159.97, Z = 184.79
7	Find position	8	1.26 mm
8	Collision detection	8	10.32 mm
9	Modify the mates	8	63.71 deg
10	Replace the part	8	X = 17.39, Y = 159.99, Z = 181.59
11	Interference detection	8	Swish Plate, Linkage (both)
12	Create coordinate system	8	X = -4.99, Y = 73.26, Z = 149.02
13	Modify the mates	8	X = -4.99, Y = 73.25, Z = 148.94
14	Measure moving angle	8	13.05 deg
	Total	109	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here
While **Fill-in-blank** type answer should be within $\pm 0.5\%$ of provided answers.

Review

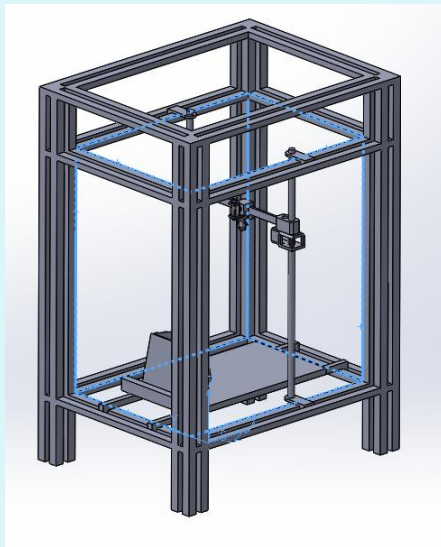
- What's your score?
- Do you finish segment 1 test within 80 minutes? ☐ Yes ☐ No
- Do you pass segment 3 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating sub-assembly
 - ☐ Creating Mates
 - ☐ Moving Parts
 - ☐ Creating Coordinate
 - ☐ Modifying Advanced Mates

E N D o f E X A M S E T N o . 5

4.7 Practice Exam Set 6 (Revised format)

Exam Set 6 [Segment 3]

Certified SolidWorks Professional CSWP Segment 3 Test



- Segment 3 Assemblies
 - Creating Probe part
 - Add part to assembly
 - Insert sub-assembly
 - Modify mates
 - Collision/Interference
 - Replace part
- Test duration: 80 min
- Total points: 109 points
- Total Questions: 14
- Pass score: 77 points

[Start Examination>](#)

Examination Information

Welcome to the CSWP Segment 3 Core Exam (CSWPCORE)

As per the Candidate Conduct Policy you have agreed to, all models you submit in response to the questions in this SOLIDWORKS Certification exam will be your original work, and you did not reuse any models from a social website or other website. Also, all answers you submit in the SOLIDWORKS Certification exam are your own and you will not obtain any answer from a third party source.

- Your exam is: **14 questions**.
- You are allowed to answer the questions in any order you prefer.
- Use the Summary Screen to see the list of all questions you have or have not answered.
- Once you click End Test, you will not be able to return to your questions.
- You will have **80 minutes** to complete this examination.
- Minimum passing score is: **77 points**.
- Your proctor is: Virtual Tester Online

Press the Start Examination button to continue

Start Examination >>

Question 1 of 14

For 5 points

This test describes the problem set that must be solved in this problem set. Please read this in its entirety before proceeding and click Yes for 5 points.

Please note that the use of other test taker's completed models and assemblies can lead to the annulment of your results per the Candidate Conduct Policy you agreed to.

You will be creating an assembly of a 3D printing machine starting with the frame. All the parts will be given to you.

You will be asked to do the following:

- Start and assembly
- Insert initial part into an assembly
- Assemble and mate part into an assembly
- Create and insert subassemblies
- Interference detection
- Create coordinate system and measure center of mass

Download the attachment file and click Yes to start next question

Attachment to this question

 Set6_Frame.SLDPRT

☒ Yes

Question 2 of 14

For 8 points

Create main assembly

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: Arbitrary

Insert the part called 'Frame' into a new assembly and fix the position of the frame
Accepting default position.

-Save the assembly with the name 'Main'

-Create a coordinate system at the corner of the frame as shown in following image
and rename it 'CS_1'

*Note: This coordinate system will be used throughout this problem set until new one
is created.

- Measure the center of Mass of the assembly relative to the coordinate system CS_1

What is the Center of Mass (mm)?

☐ X=110.00, Y=85.00, Z=166.51

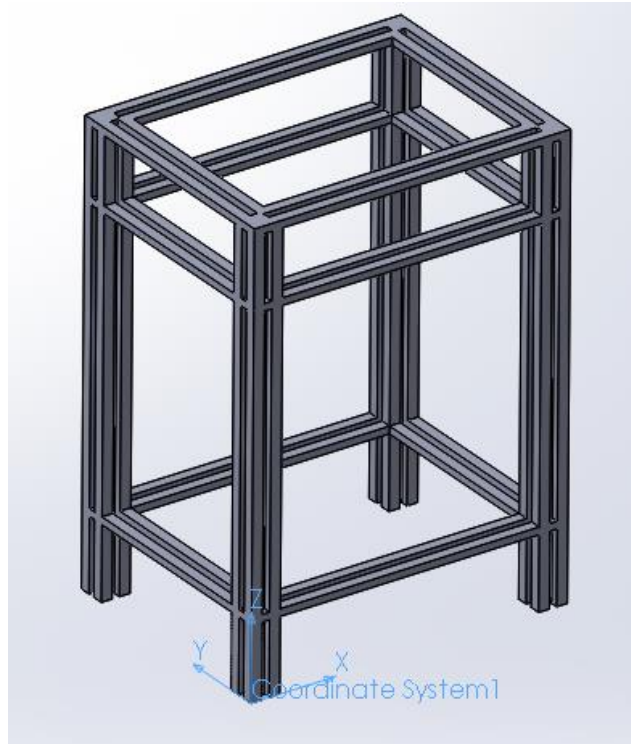
☐ X=0, Y=0, Z=0

☐ X=100, Y=65.00, Z=150.00

☐ X=30.00, Y=56.00, Z=84.55

[Next question >>](#)

Reference Image for Q2 of Exam Set 6 >>



Question 3 of 14

For 8 points

Insert Panel component into main assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Insert Panel component into main assembly

-Position the Panel component with respect to the frame component as shown in the following image. Create all the necessary mates.

-Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

Y=

Z=

(Use . (Point) as decimal separation)

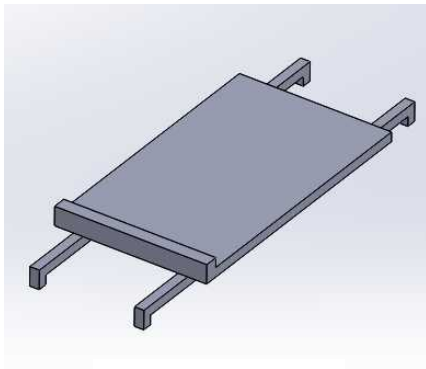
Attachment to this question



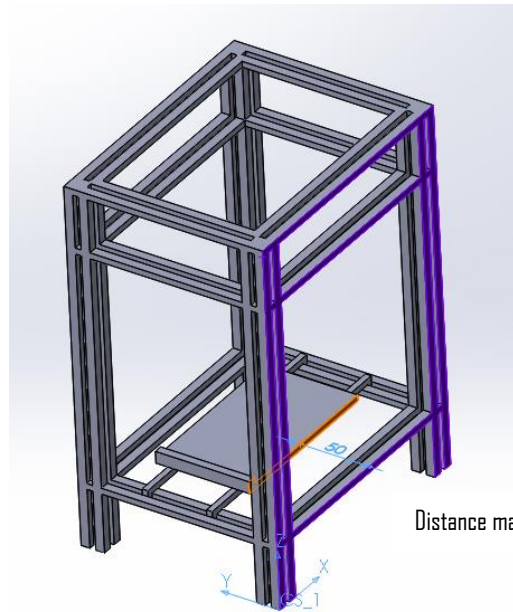
Set6_Panel.SLDPRT

[Next question >>](#)

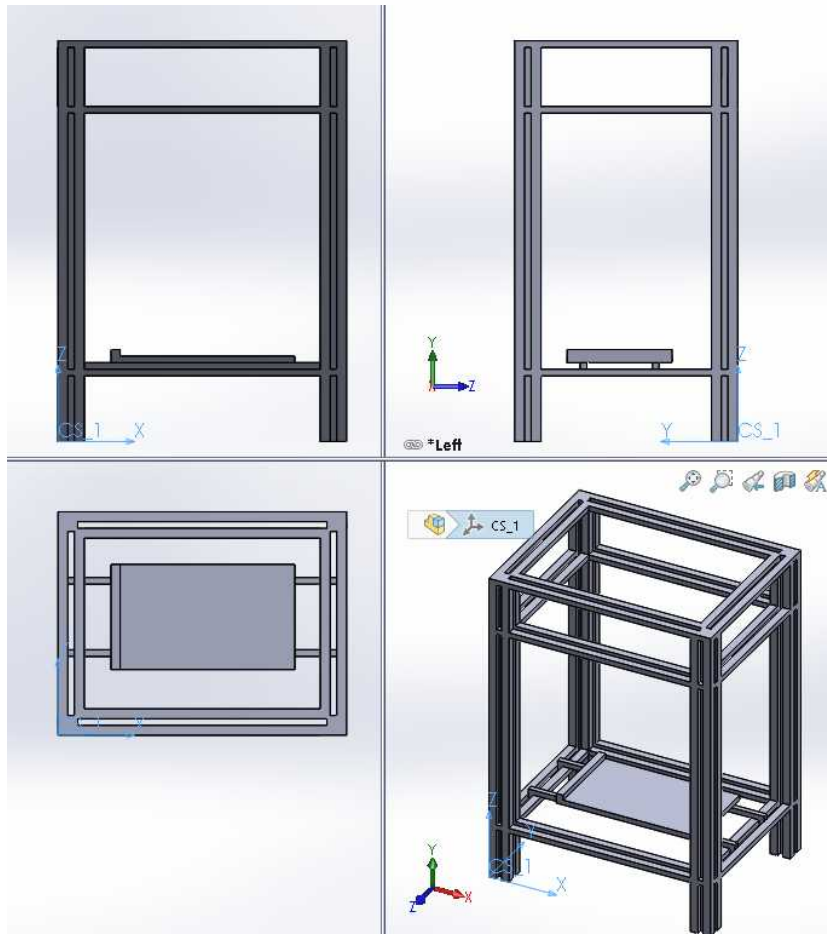
Reference Image for Q3 of Exam Set 6 >>



Panel component



Distance mate =50mm



Assembly with mates

Question 4 of 14

For 8 points

Insert Side Bar assembly (SB_1) into main assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Insert Side Bar assembly (SB_1) into main assembly

-Position SB_1 subassembly with respect to the main assembly as shown in the following image. Inserted subassembly should be treated as rigid component. Create all the necessary mates.

-Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

Y=

Z=

(Use . (Point) as decimal separation)

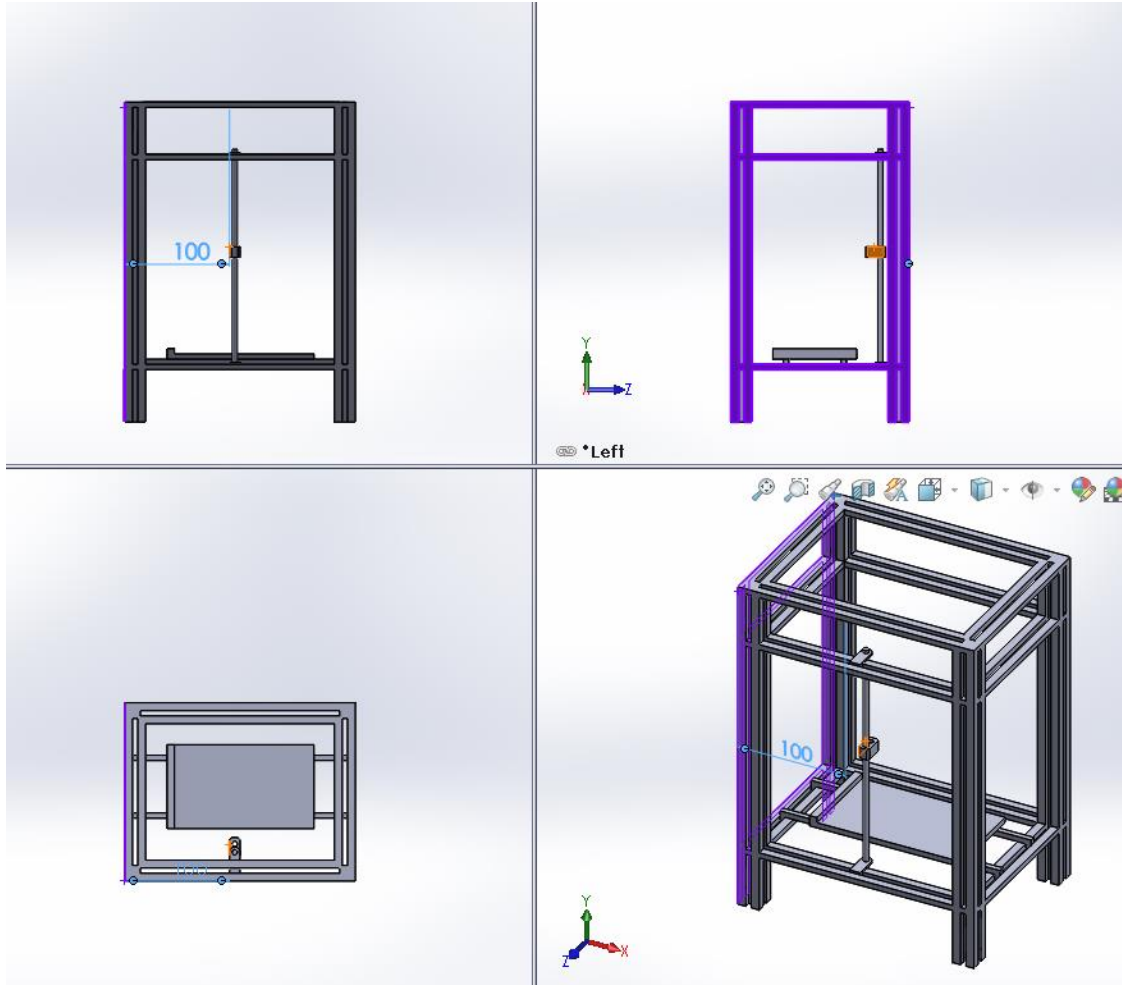
Attachment to this question



SB_1.SLDASM

Next question >>

Reference Image for Q4 of Exam Set 6 >>



Question 5 of 14

For 8 points

Insert Side Bar assembly (SB_2) into main assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Insert Side Bar assembly (SB_2) into main assembly

-Position SB_2 subassembly with respect to the main assembly as shown in the following image. Inserted subassembly should be treated as rigid component. Create all the necessary mates.

-Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

Y=

Z=

(Use . (Point) as decimal separation)

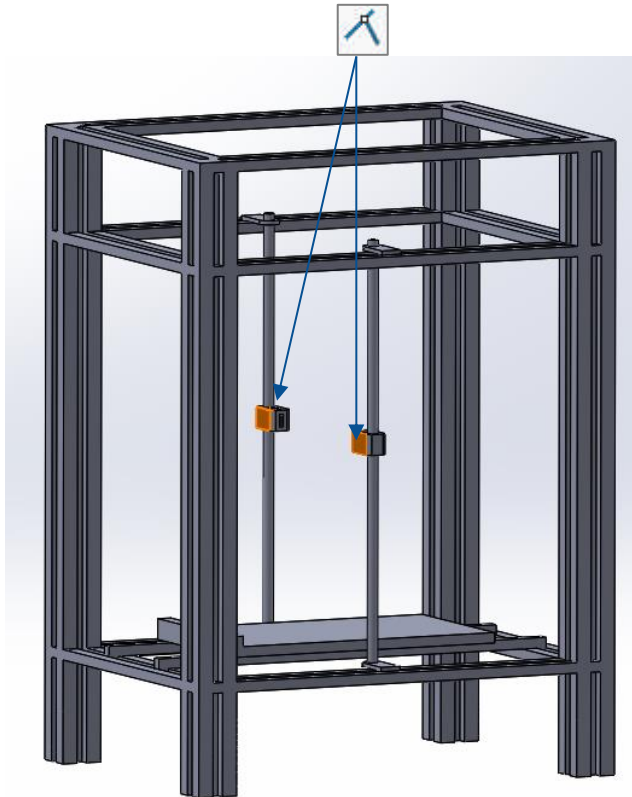
Attachment to this question



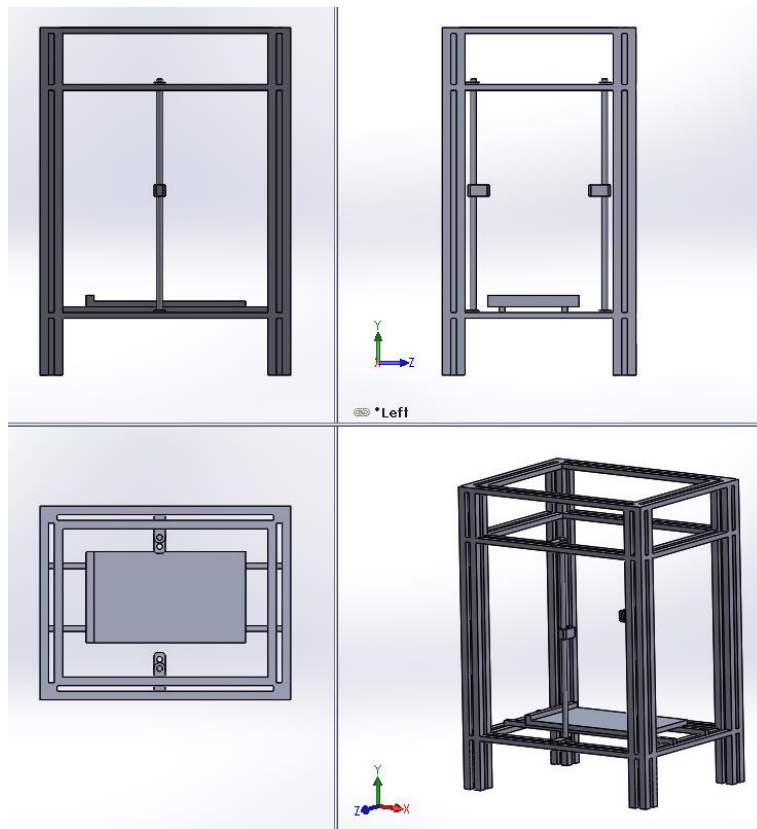
SB_2.SLDASM

Next question >>

Reference Image for Q5 of Exam Set 6 >>



Assembly with mates



Question 6 of 14

For 8 points

Insert Nozzle Assembly (NA) into main assembly.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_1

-Insert Nozzle assembly (NA) into main assembly

-Position NA subassembly with respect to the main assembly as shown in the following image. Inserted subassembly should be treated as flexible component so that components in subassembly are able to move freely. Create all the necessary mates. Some existing mates might need adjustment

-Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

Y=

Z=

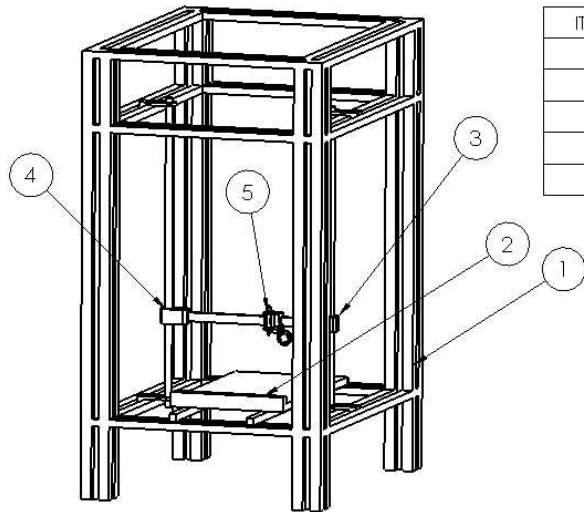
(Use . (Point) as decimal separation)

Attachment to this question

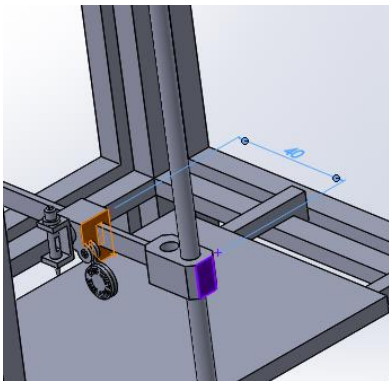
 NA.SLDASM

[Next question >>](#)

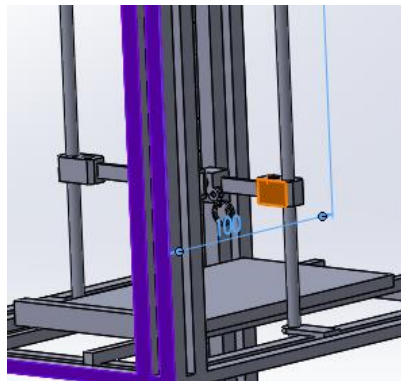
Reference Image for Q6 of Exam Set 6 >>



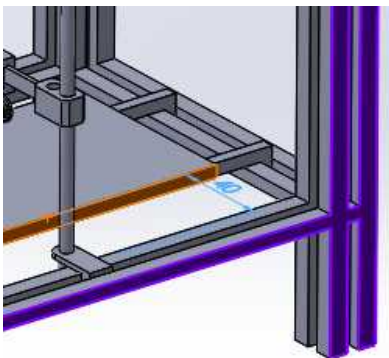
ITEM NO.	COMPONENT	QTY.	TYPE
1	Set6_Frame	1	PART
2	Set6_Panel	1	PART
3	SB_1	1	SUBASSEMBLY
4	SB_2	1	SUBASSEMBLY
5	NA	1	SUBASSEMBLY



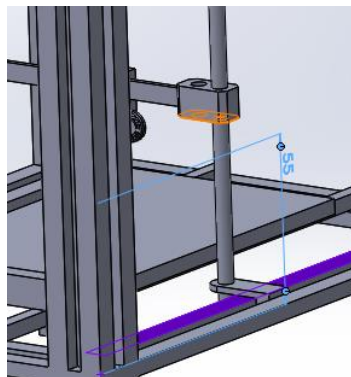
Component ③-⑤ distance mate



Component ①-③ distance mate



Component ①-② distance mate



Component ①-③(Bracket) distance mate

Question 7 of 14

For 8 points

Collision detection

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_1

- Insert a 3D product on the Panel and locate it as shown in following images.
- Other mates maintain the status of previous question unless indicated.
- With **collision detection** turned on (stop at collision 'ON'), move the Nozzle head unit toward +Y direction of the coordinate system (CS_1) from the end of the frame.
- When a collision occurs measure the distance, Y, indicated in the image.

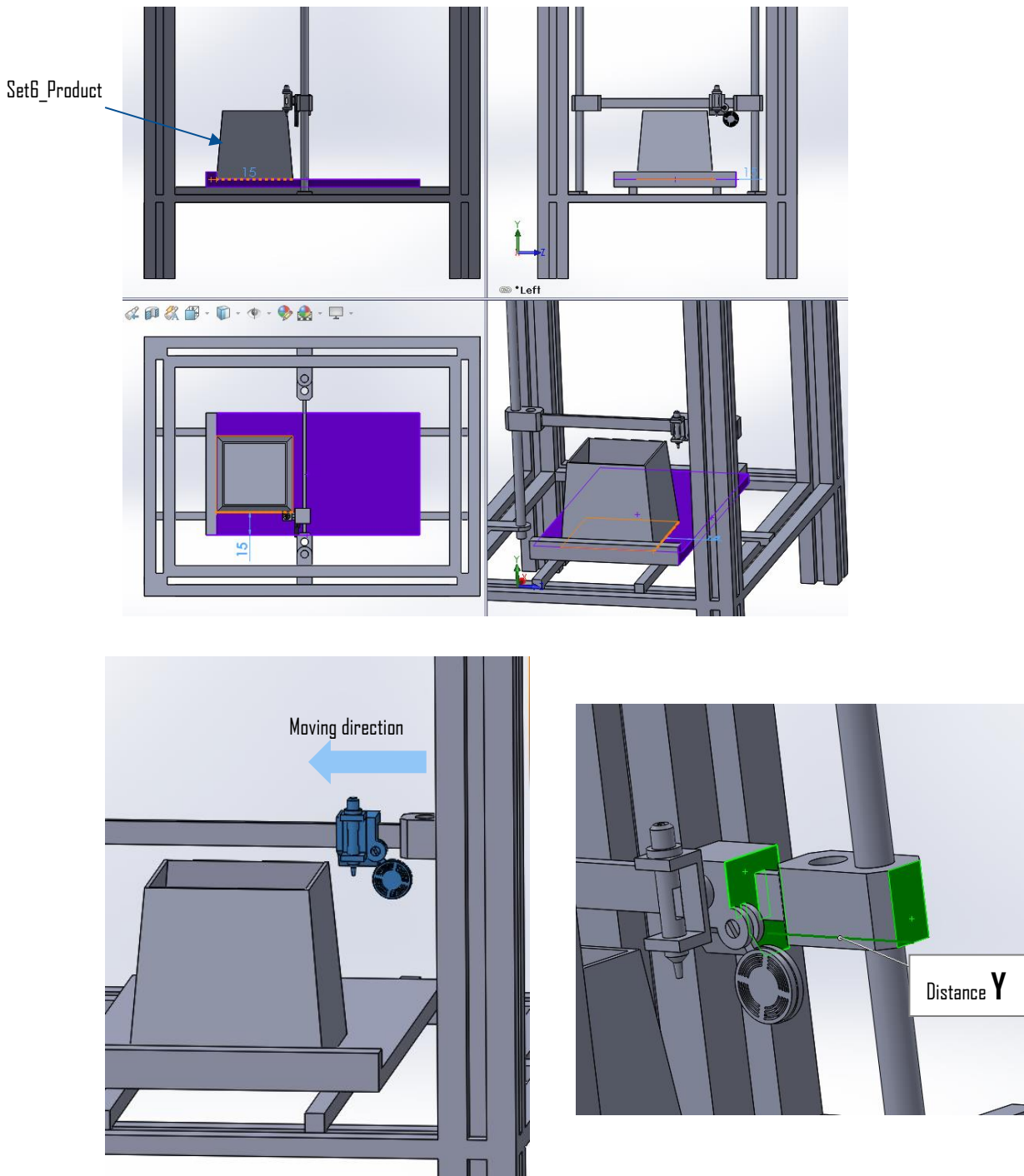
What's the distance Y (mm)?

Enter values

(Use . (Point) as decimal separation)

Next question >>

Reference Image for Q7 of Exam Set 6 >>



Question 8 of 14

For 8 points

Find position.

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_1

- Modify the necessary mates so that nozzle body can move freely in X, Y, Z direction.
- Some mates in subassembly might need to be adjusted.
- Position the center of nozzle tip on the corner point of product as shown in the following images.

- Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

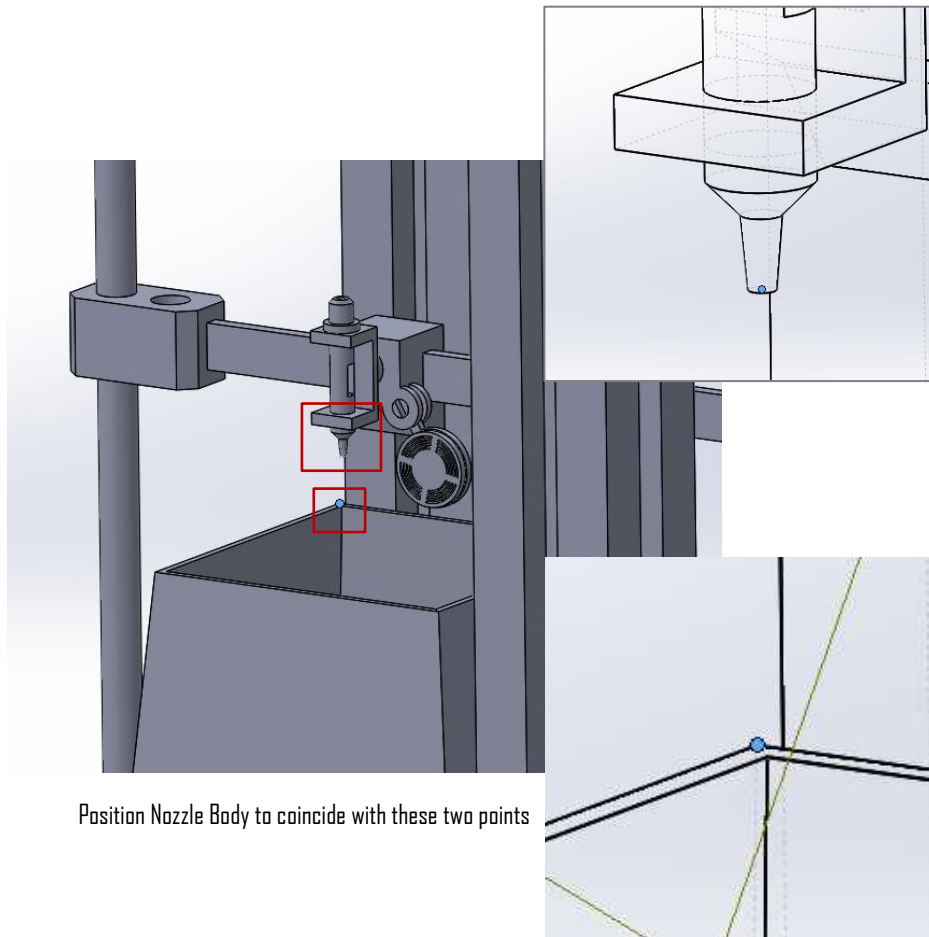
Y=

Z=

(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q8 of Exam Set 6 >>



Question 9 of 14

For 8 points

Add component and measure COG

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_1

- Download and Insert component 'Set6_MotorUnit' to main assembly
- Create proper mates as shown in the following images.
- Other mates are same as directed in the previous question

-Measure the Center of Mass of the assembly relative to the coordinate system CS_1 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

Y=

Z=

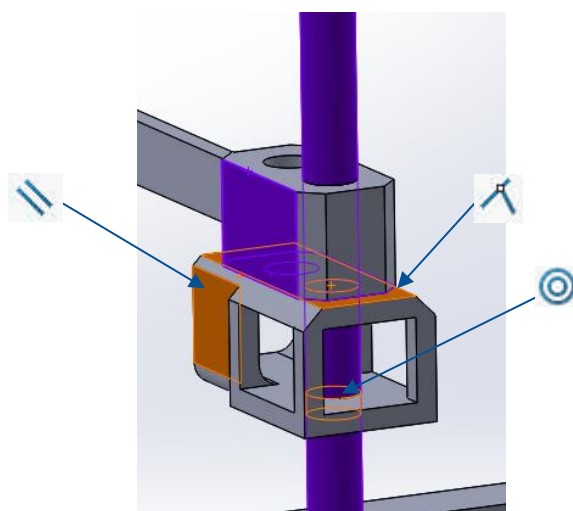
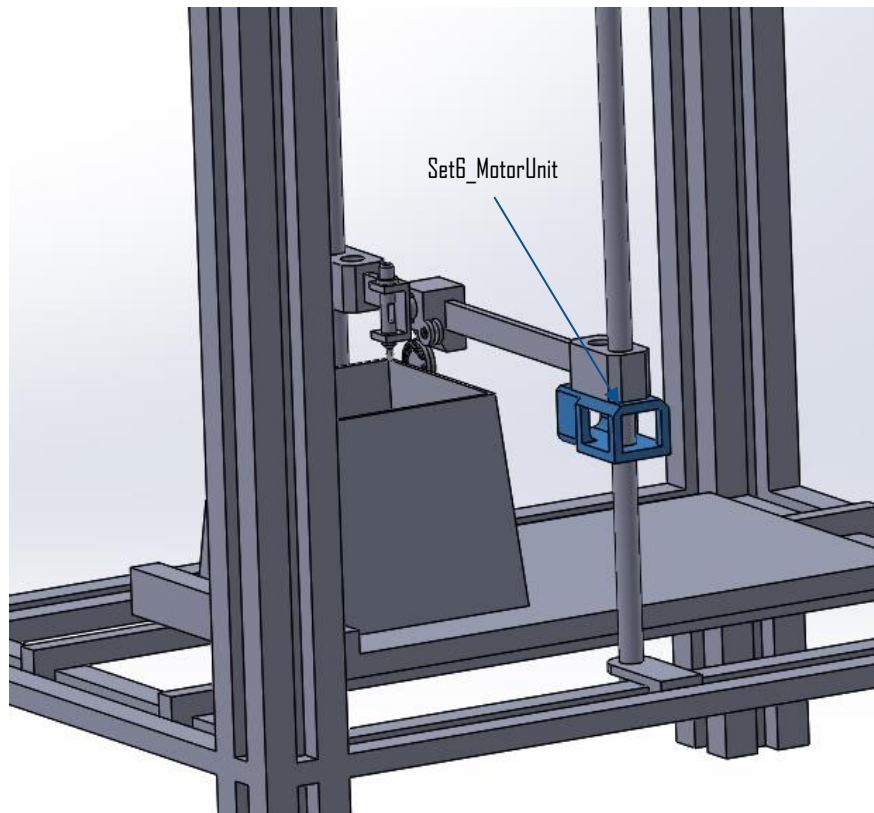
(Use . (Point) as decimal separation)

Attachment to this question

 Set6_MotorUnit.SLDPRT

[Next question >>](#)

Reference Image for Q9 of Exam Set 6 >>



Mates with existing components

Question 10 of 14

For 8 points

Create new coordinate system

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

-Create new coordinate system and name it 'CS_2'

-Other mates are same as directed in the previous question

-Measure the Center of Mass of the assembly relative to the coordinate system CS_2.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

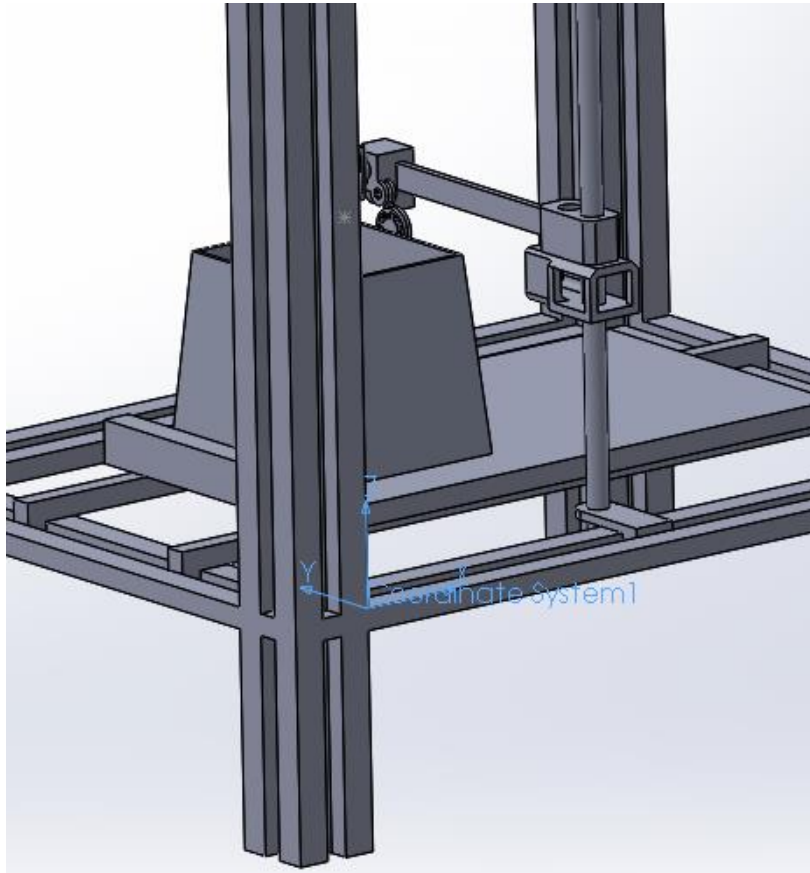
Y=

Z=

(Use . (Point) as decimal separation)

[Next question >>](#)

Reference Image for Q10 of Exam Set 6 >>



New Coordinate System Position

Question 11 of 14

For 10 points

Interference detection

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_2

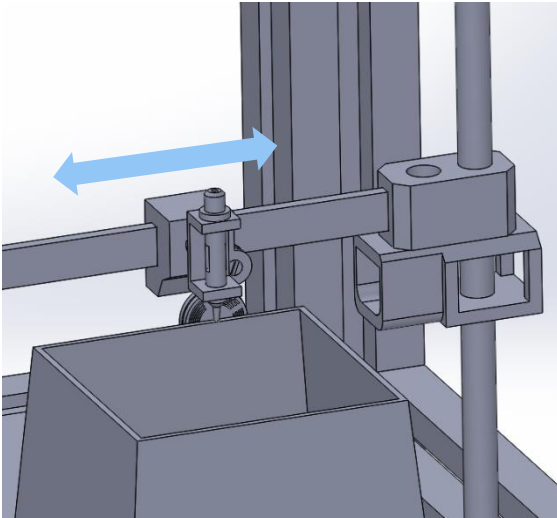
- Other mates maintain the status of previous question unless indicated.
- Modify the mates to be only Nozzle Body's Y-direction movement allowed
- Create distance mates between Nozzle Body and SB_1 as shown in following images.
- Perform an interference Detection check on the main assembly while turning on the following options
 - Make interference parts transparent
- * Note: All other interference detection options will be unchecked (OFF)

Select all the components that are found to cause interferences or No interferences detected if no interference are found.

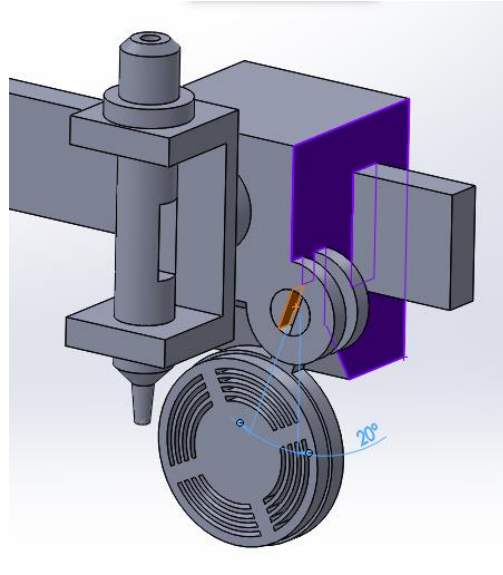
List all components that interference occurs

[Next question >>](#)

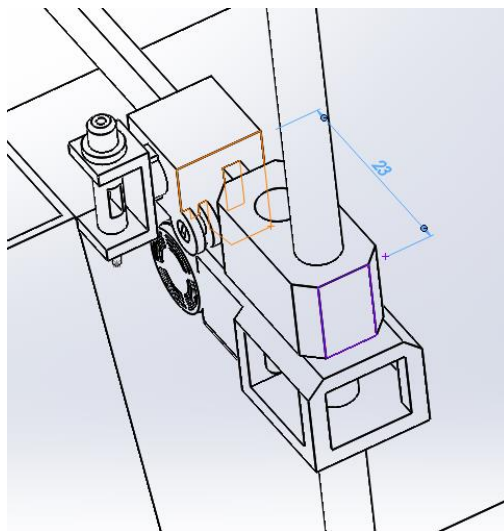
Reference Image for Q11 of Exam Set 6 >>



Only Y-directional movement allowed



Cooling Fan's mate adjustment



Nozzle Body's distance mate adjustment

Question 12 of 14

For 8 points

Modify sketch and repair mates

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_2

- Modify Sketch1 in Set6_Product part as shown in the following images.
- Other mates maintain the status of previous question unless indicated.
- Repair mates to comply with the position of the part as directed in the following images
- Position the center of nozzle tip on the corner point of product as shown in the following images.
- Measure the Center of Mass of the assembly relative to the coordinate system CS_2 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

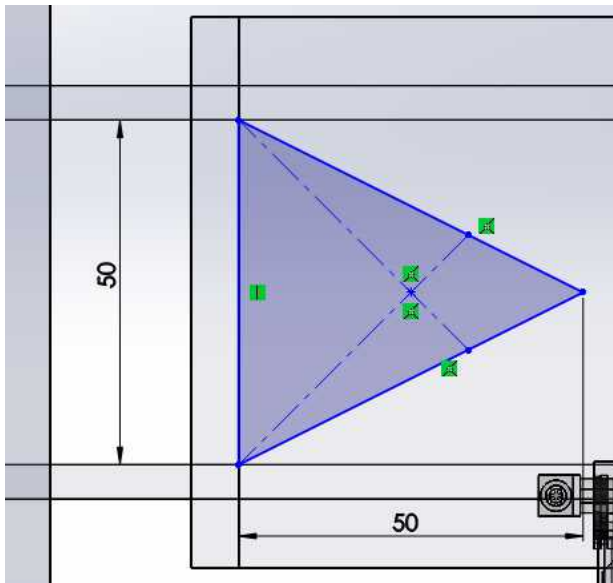
Y=

Z=

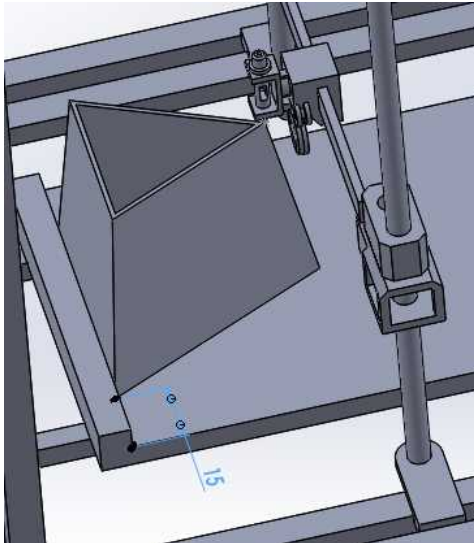
(Use . (Point) as decimal separation)

[Next question >>](#)

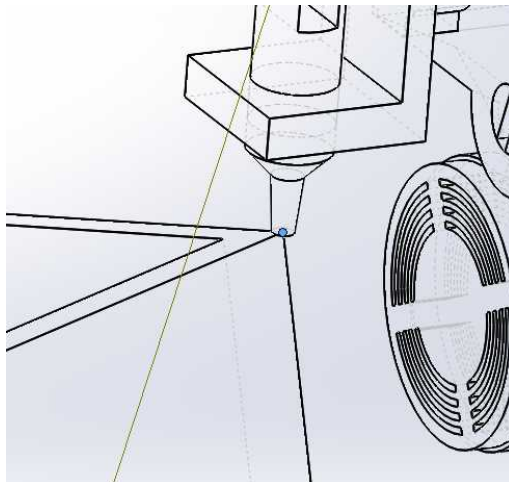
Reference Image for Q12 of Exam Set 6 >>



Modified profile of Sketch1 in Set6_Product



Repair the mates between Set6_Product and Set6_Panel



Coincident mate of these points

Question 13 of 14

For 8 points

Replace the existing component (Nozzle Head)

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_2

-Download NozzleHead_New part

-Replace it with existing NozzleHead.

-Modify all the necessary mates to comply with the position of the NozzleHead as directed in the following images

-Measure the Center of Mass of the assembly relative to the coordinate system CS_2 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

Y=

Z=

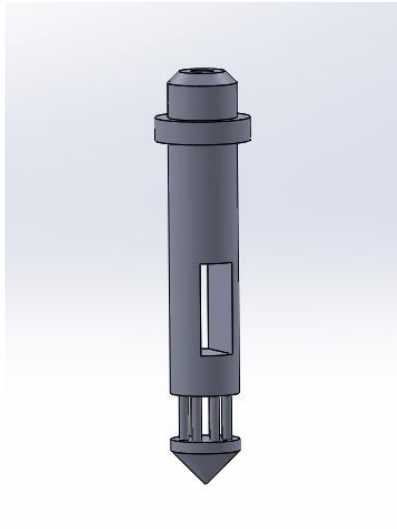
(Use . (Point) as decimal separation)

Attachment to this question

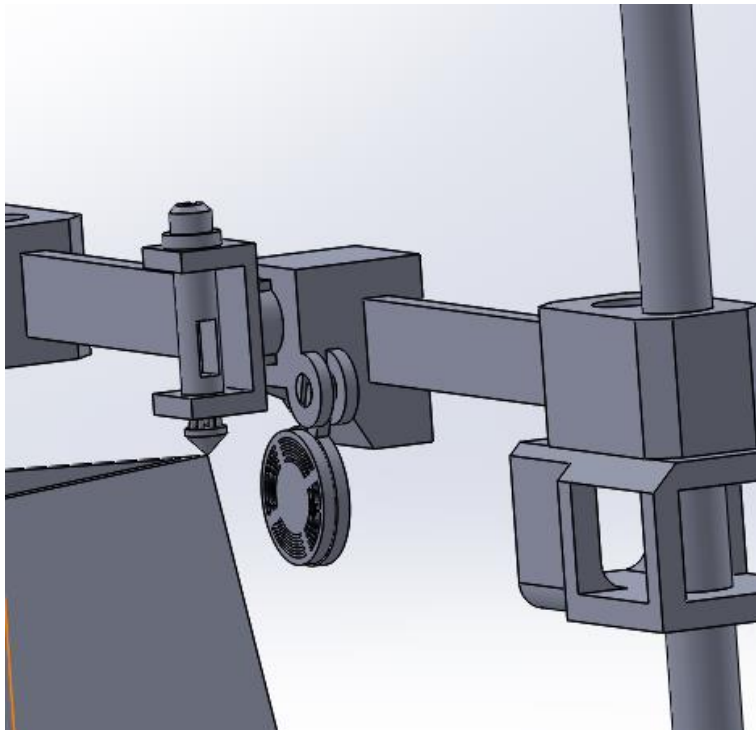


Set6_NozzleHead_New.SLDPRT

Reference Image for Q13 of Exam Set 6 >>



Set6_NozzleHead_New part



Position and orientation of the replacing part

Question 14 of 14

For 8 points

Find position and measure tool

Unit system: MMGS (millimeter, gram, sec)

Decimal places: 2

Assembly origin: CS_2

-Assume that the blue line of frame is the movable space of the Nozzle Head.

-Move the nozzle body to meet the following conditions.

*The distance is measured based on the tip point of the nozzle head.

-Modify all the necessary mates to comply with the position of the Nozzle Head as directed in the following images

- 30% of the total travel distance along the X-axis,
- 50% of the total travel distance along the Y-axis
- 60% of the total travel distance along the Z-axis

-Measure the Center of Mass of the assembly relative to the coordinate system CS_2 created earlier.

What is the Center of Mass of the assembly (mm)?

Enter Coordination

X=

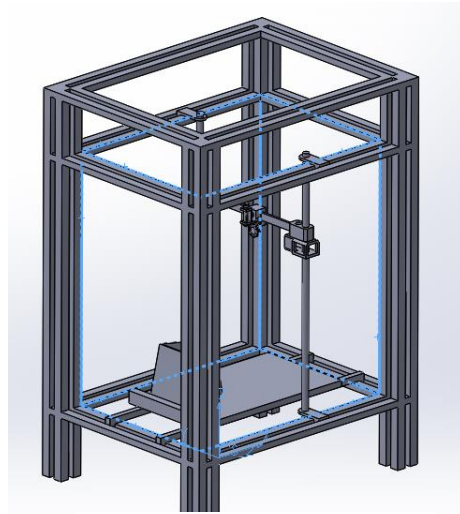
Y=

Z=

(Use . (Point) as decimal separation)

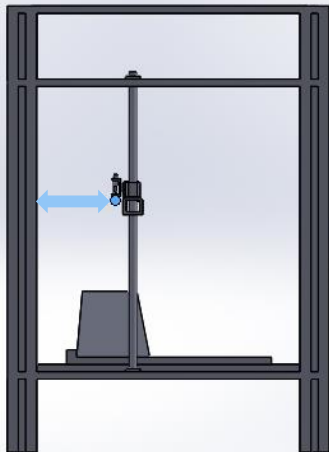
[Next question >>](#)

Reference Image for Q14 of Exam Set 6 >>

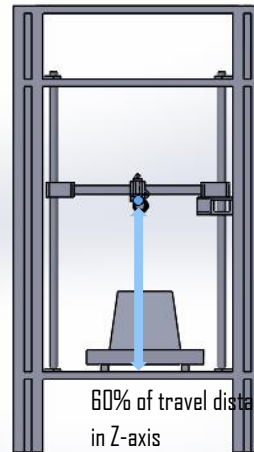


Movable space of Nozzle Head

30% of travel distance in X-axis

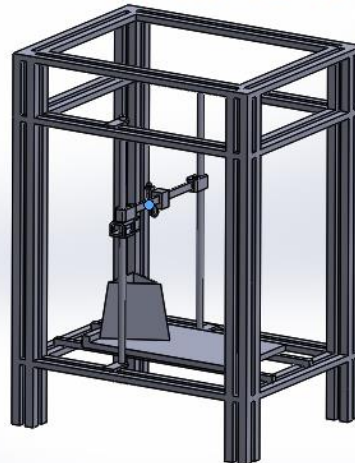
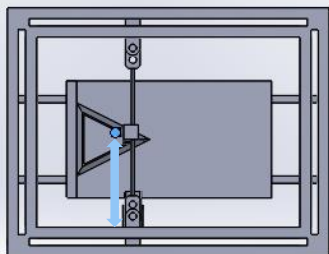


60% of travel distance in Z-axis



*Left

50% of travel distance in Y-axis



Answer Sheet

EXAM SET 6

Summary

Check your score based on the following answers

No	Question	Points	Answer
1	Instruction	5	-
2	Create assembly	8	☐ X=110.00, Y=85.00, Z=166.51
3	Insert part to main assembly	8	X = 109.73, Y = 85.60, Z= 153.93
4	Insert subassembly(SB_1)	8	X = 109.68, Y = 84.92, Z= 153.87
5	Insert subassembly(SB_2)	8	X = 109.62, Y = 85.59, Z= 153.82
6	Insert subassembly(NA)	8	X = 109.60 Y = 84.37 Z = 153.65
7	Collision detection	8	29.85
8	Find Position	8	X = 108.96 Y = 84.38 Z = 152.44
9	Insert Part and Mates	8	X = 108.95 Y = 84.26 Z= 152.34
10	New Coordinate	8	X = 88.95 Y = 84.26 Z = 97.34
11	Interference detection	8	Nozzle Body, Motor Unit, Cooling Fan
12	Modify the sketch	8	X = 88.91 Y = 84.23 Z = 97.73
13	Replace the part	8	X = 88.91 Y = 84.23 Z = 97.72
14	Find Position	8	X = 88.49 Y = 84.24 Z = 98.41
	Total	109	

*Note: **Multiple choice** type answer should be exactly matched with provided answers here
While **Fill-in-blank** type answer should be within $\pm 0.5\%$ of provided answers.

Review

- What's your score?
- Do you finish segment 1 test within 80 minutes? ☐ Yes ☐ No
- Do you pass segment 3 test? ☐ Yes ☐ No
- What's your weakest points? (Check a couple of items and try practicing them more)
 - ☐ Manipulating sub-assembly
 - ☐ Creating Mates
 - ☐ Moving Parts
 - ☐ Creating Coordinate
 - ☐ Modifying Advanced Mates
 - ☐ Part Creation

E N D o f E X A M S E T N o . 6



Concept Design, created by the author 2017
SOLIDWORKS modeling and rendering

Final Thought

This is the first edition of the CSWP preparation book which is published in 2020. The motivation for writing this book was started from an early stage of my preparation period for the CSWP exam. Actually, it is not difficult to pass the exam since I was using SOLIDWORKS in daily design work and I know it is very easy to learn and fun to use. However, many of our colleagues had difficulty to pass this exam on the first attempt. There were some on-line studying materials available, but they were lacking information and didn't cover all topic of the exam. Also, there were various off-line training programs, but they were time-consuming and a little bit costly. This book was developed to help students, engineers and any professionals desiring to get a CSWP certificate. We need an exam-oriented preparation book and sufficient Hands-on practice materials to focus on getting the certificate of CSWP. That's the main purpose of this book. Hopefully, the readers could find fun and enjoyment during the preparation of the CSWP. It's a good opportunity to learn SOLIDWORKS seriously. Engineering design is everywhere and everyday things that come up with someone's creativity. Creating something new and bringing it to life is amazing. 3D modeling is the first step to bring something in your brain to real life. I am grateful to my colleagues for their support and encouragement during this project. I also want to thank the reviewers whose comments have undoubtedly made the book better. If there is an opportunity, I will prepare a better edition that reflects the latest trends in the coming future.

Ryan Lee
April, 2020

About the Author

The author has over 20 years of experience in the various engineering fields and has been active in many aerospace/defense development programs with the government research agency and commercial corporations worldwide. He has published more than 20 science papers in the various engineering fields and published several books in the Engineering domain. Also, he is a holder of several patents regarding the aerospace engineering field. His experience includes as Chief Leader of Material Analysis Lab in the Airforce, Project Manager of Turboshift Engine development program, Failure analyst, FEM, and CFD analyst, Metallurgical analyst with fractography, Aircraft Accident Investigation Board Member and Instructor of various engineering fields.

Appendix

3D Modeling Exercise

Scan below QR code to visit download site. If you are unable to download them, please contact us or register our site.



A1. 3D Modeling Exercise

Introduction

This chapter is designed to help beginners, students and engineers interested in SOLIDWORKS CSWA and CSWP by practicing 10 exercise problems. It provides practical Tips and Knowhow to enhance the modeling speed and accuracy which are essential elements to pass the certification exam. This practice helps users to upgrade design skills including how to analyze the drawings, how to use powerful toolset of SOLIDWORKS, and how to build up modeling strategy. Model files used in exercises can be downloaded by scanning the provided QR code that connects to file download links.

10 drawings are provided to improve your modeling skills. The most essential skill for CSWP is the speedy part modeling. In this appendix A1, you can practice part modeling having a similar difficulty level of the actual exam.

“Learn by Practicing”

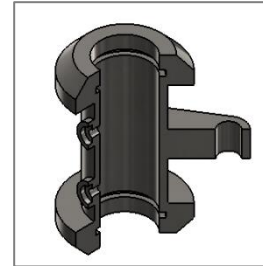
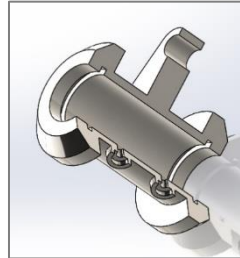
How to use this chapter

Every practice model has the desired modeling time with certain tips and knowhow. Try to model the part within a given time. If you fail to create a part, then think of other modeling strategies and try again to meet the given time requirement. This training process will help you to understand the drawing better and enhance skills to capture the design intent. Those are critical skills to pass the CSWP exam.

Exercise No.1 Cylindrical Fitting

Introduction

- Difficulty level: **Easy** | Normal | Hard | Challenging
- Desired time: 15 min
- No. of Features: 8~10
- Unit: MMGS (2 decimal)
- Material: AISI 1020
- Resulting Weight: **1005.48 g**
- * Note: Drawing is shown in next page

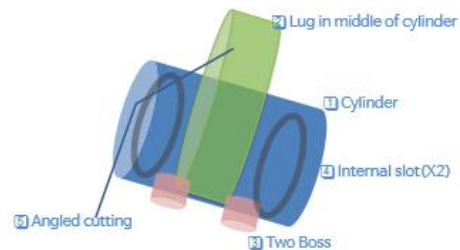


Think of modeling process before get into detail.

When you see a part image, firstly you have to think of how to create this part and creating feature order in your head to increase the modeling speed. There is no right single answer. There are various ways to create this part. But we need to train the fastest and efficient way with accurate dimensions. The essential skill is to catch the best modeling strategy within a minute.

Just look at above images and think of order of feature creation. In this case, we could think of creating features as following order:

- 1 creating big cylinder
- 2 Lug in the middle of cylinder
- 3 creating two boss
- 4 making internal circular slot
- 5 Then, finally cutting the parts.



You better think on your own order and practice as you go on thinking.

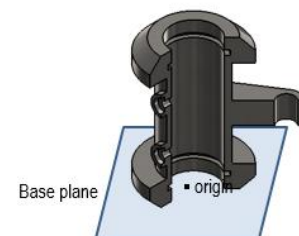
Another important thing is to select “**proper base plane and origin**”.

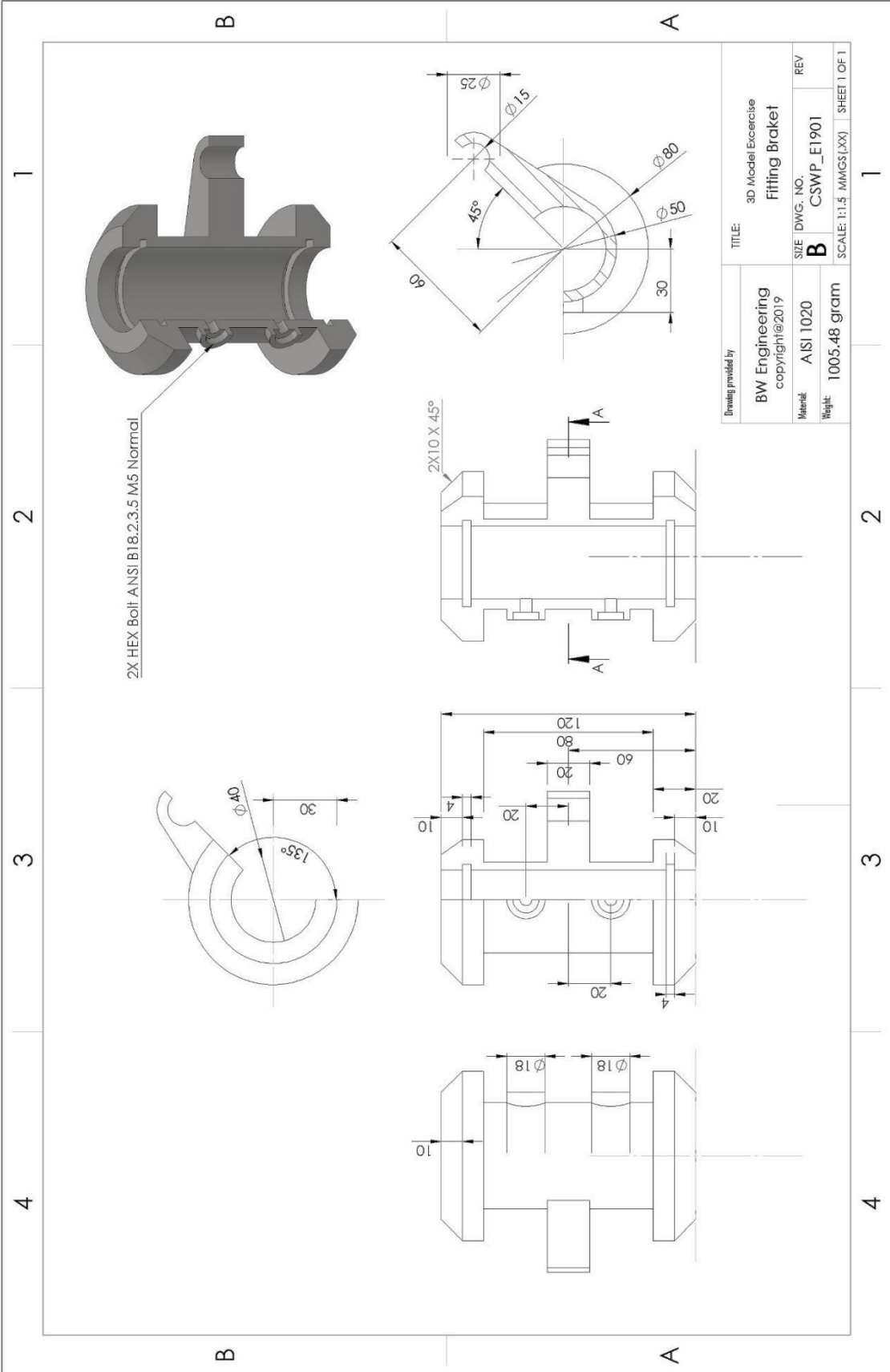
Check the dimension in drawing, then you could find the base plane where most dimensions starting from there.

In this case, you could easily find the base plane and origin.

Then, just build up features from there. Keep trying to use the dimension provided in drawing instead of any assumption.

Don't assume anything that is not clearly stated.

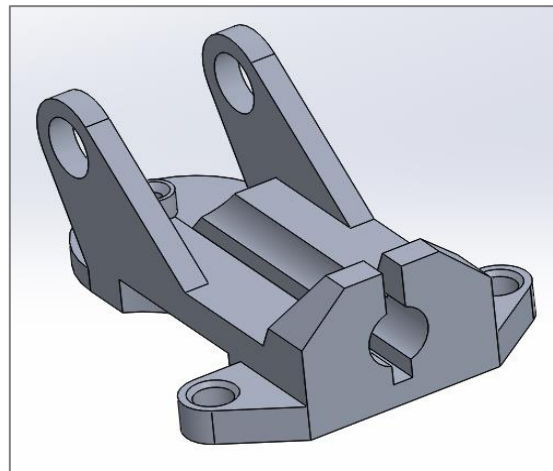
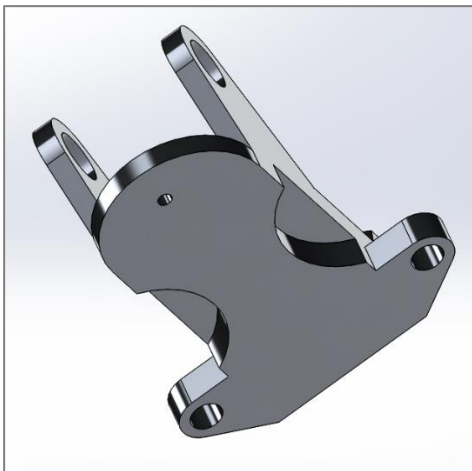
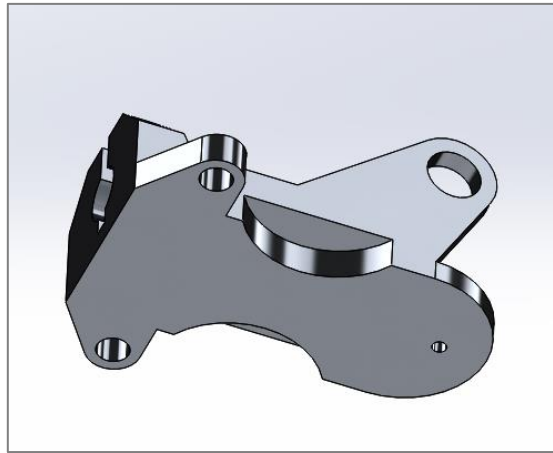
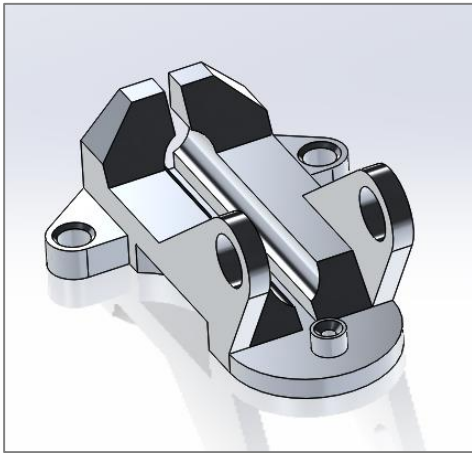


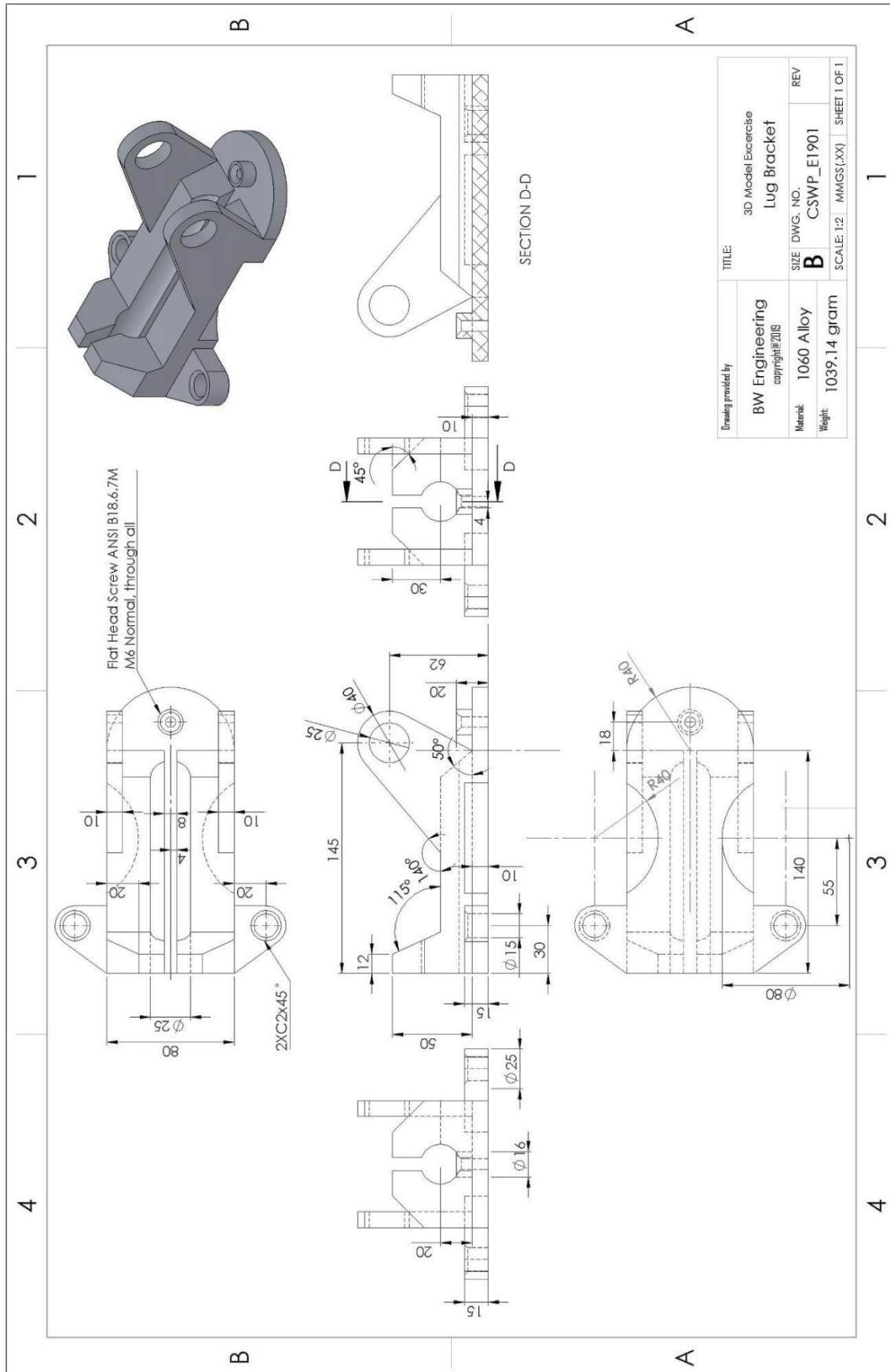


Exercise No.2 Lug Bracket

Introduction

- Difficulty level: Easy | **Normal** | Hard | Challenging
 - Desired time: 18 min
 - No. of Features: 9~11
 - Unit: MMGS (2 decimal)
 - Material: 1060 Alloy
 - Resulting Weight: **1039.14 g**
- * Note: Drawing is shown in next page

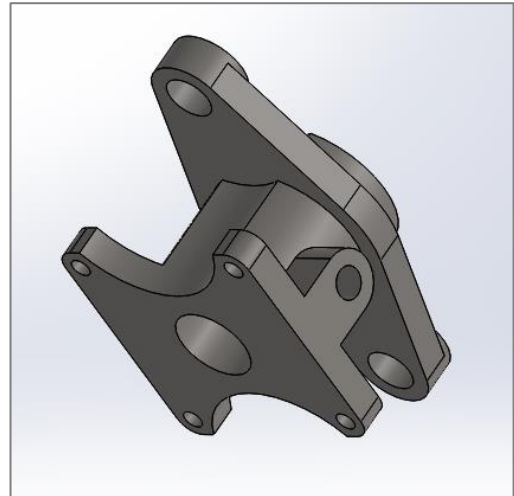
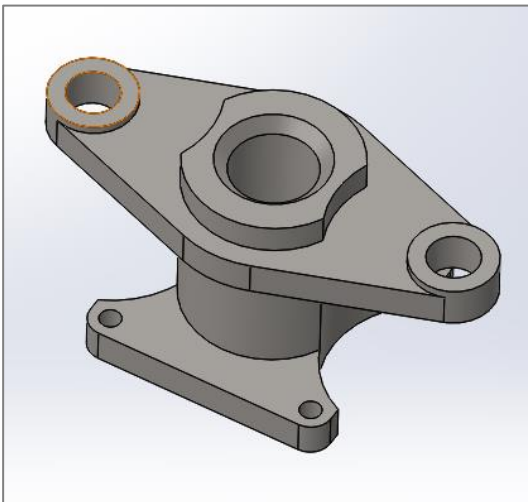
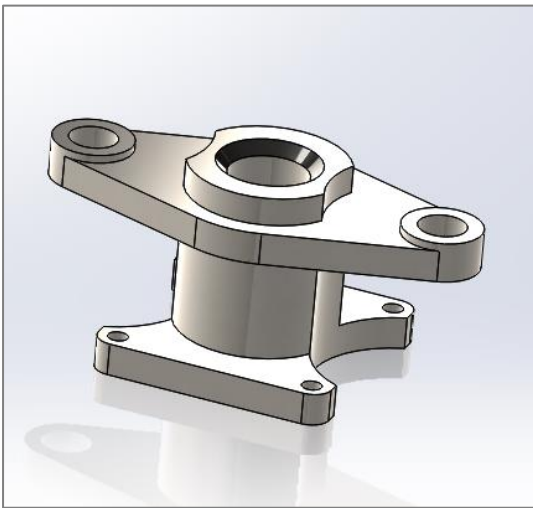


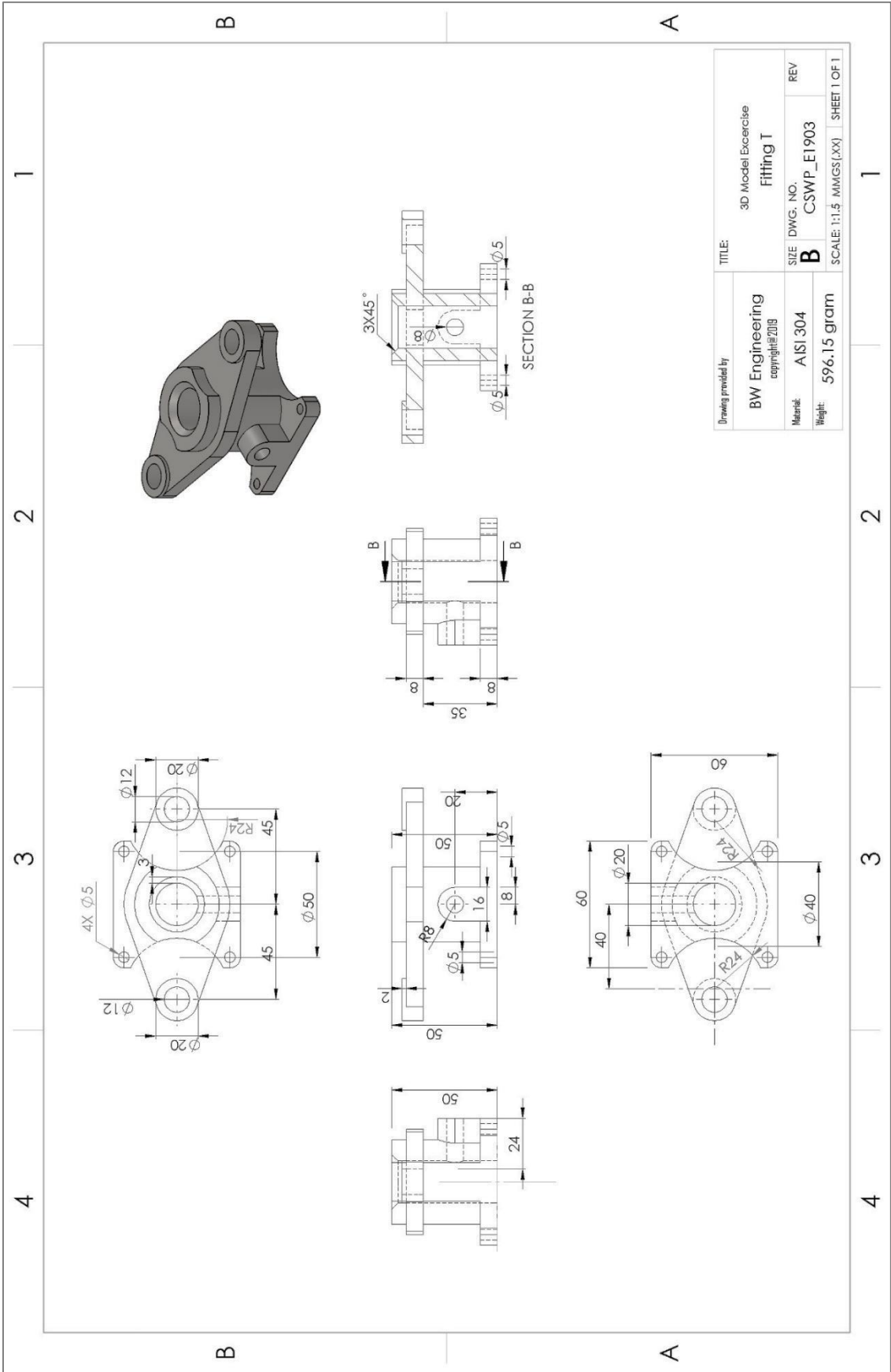


Exercise No.3 T Fitting

Introduction

- Difficulty level: **Easy** | Normal | Hard | Challenging
 - Desired time: 15 min
 - No. of Features: 8~10
 - Unit: MMGS (2 decimal)
 - Material: AISI 304
 - Resulting Weight: **595.15 g**
- * Note: Drawing is shown in next page

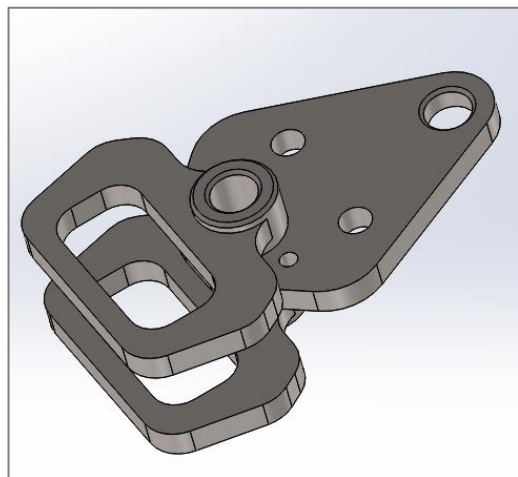
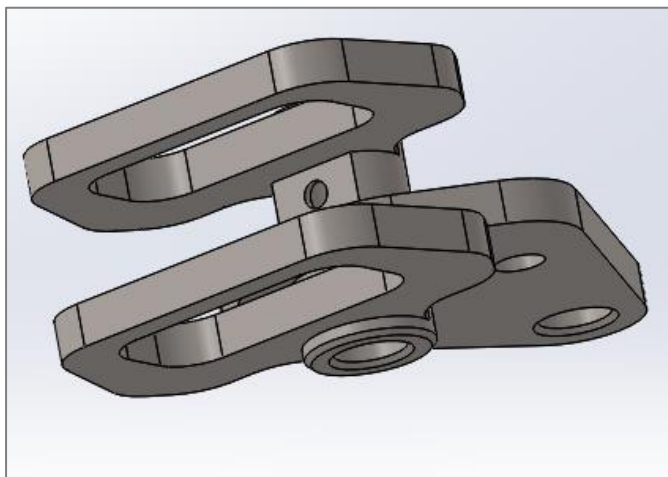
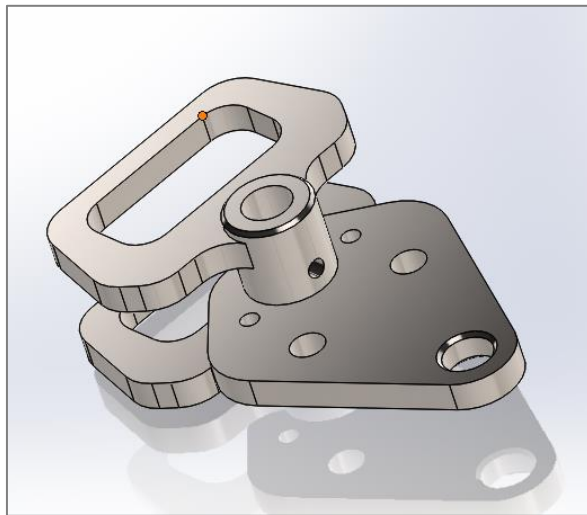


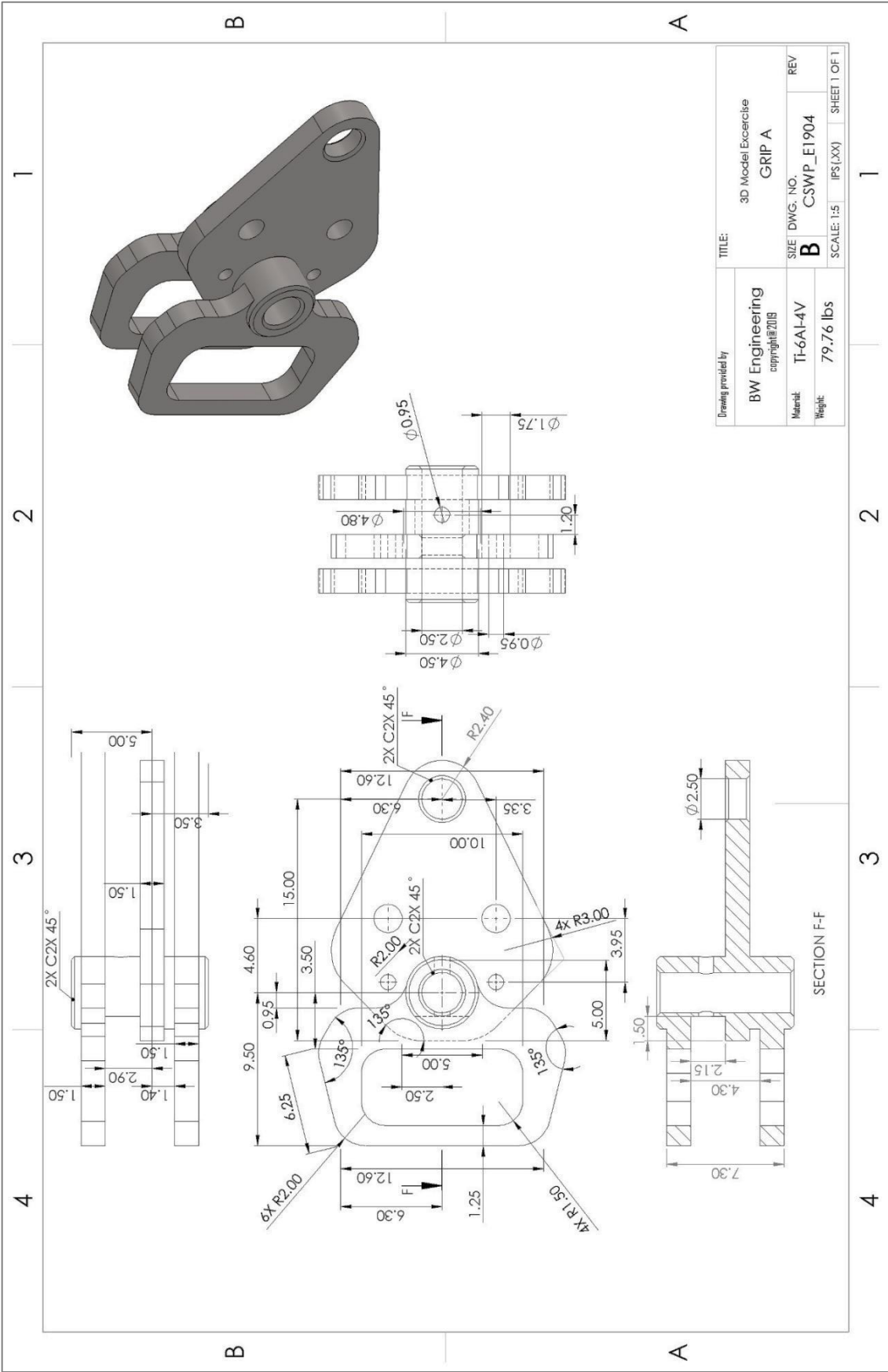


Exercise No.4 Grip A

Introduction

- Difficulty level: Easy | **Normal** | Hard | Challenging
 - Desired time: 18 min
 - No. of Features: 9~11
 - Unit: IPS (2 decimal)
 - Material: Ti-6Al-4V Solution treated and aged
 - Resulting Weight: **79.76 lbs.**
- * Note: Drawing is shown in next page

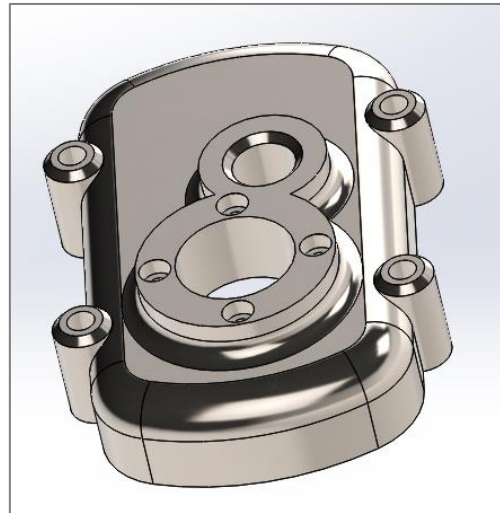
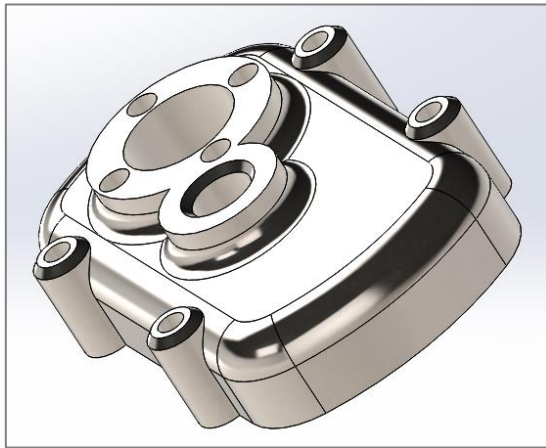


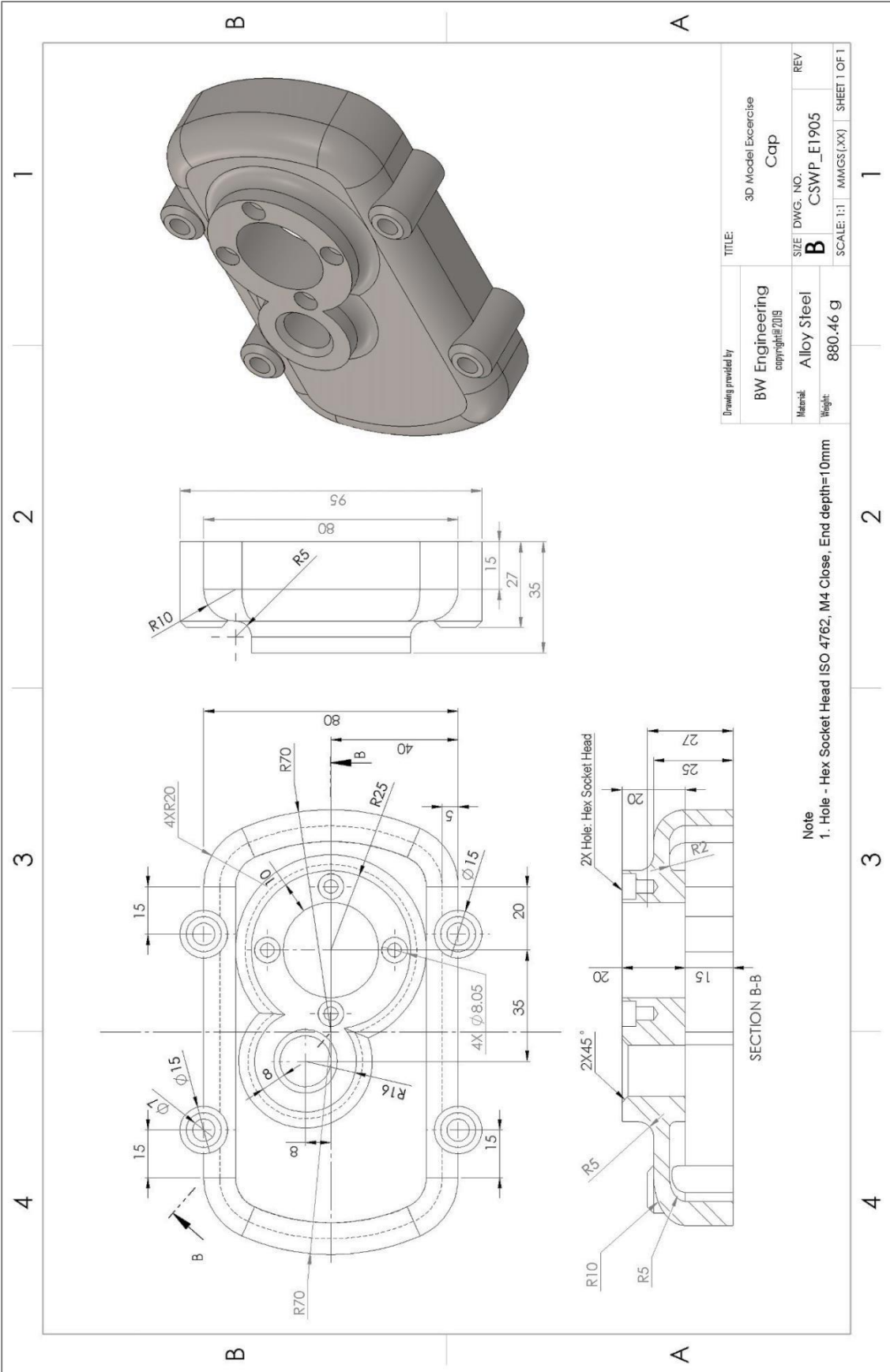


Exercise No.5 Cap

Introduction

- Difficulty level: Easy | Normal | **Hard** | Challenging
- Desired time: 20 min
- No. of Features: 11~13
- Unit: MMGS (2 decimal)
- Material: Alloy Steel
- Resulting Weight: **880.46 gram**
- * Note: Drawing is shown in next page

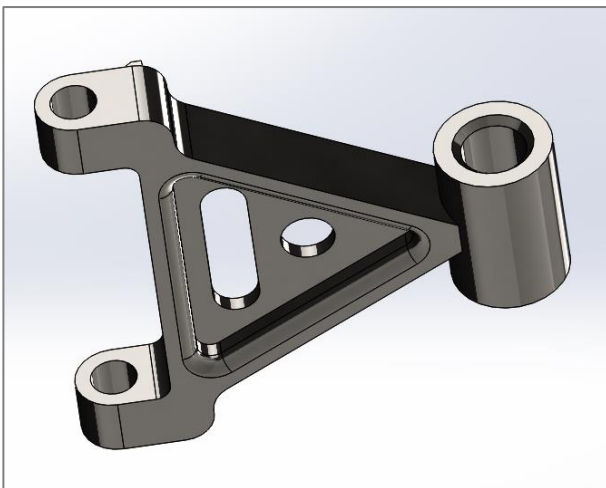
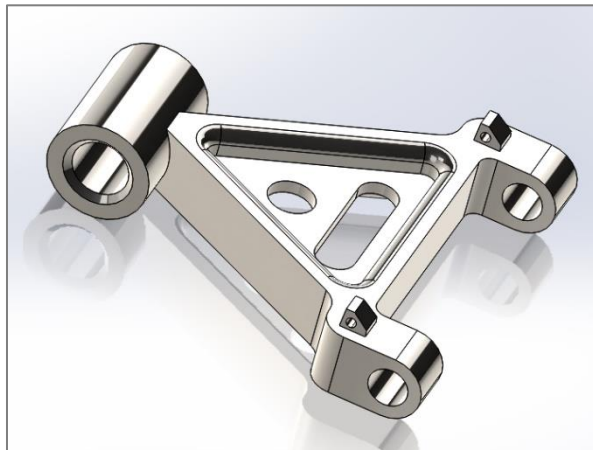


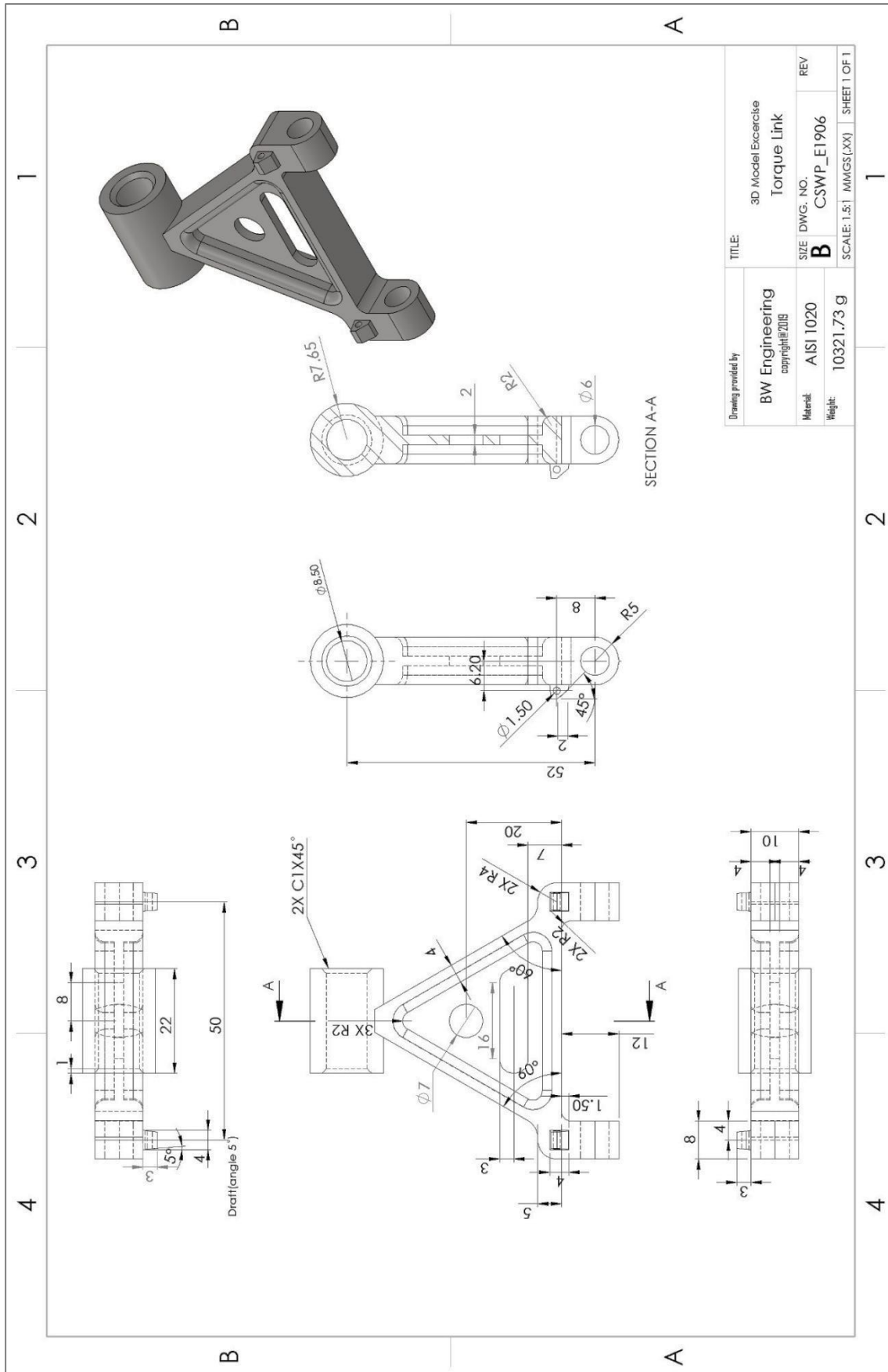


Exercise No.6 Torque Link

Introduction

- Difficulty level: Easy | **Normal** | Hard | Challenging
- Desired time: 18 min
- No. of Features: 12~14
- Unit: MMGS (2 decimal)
- Material: AISI 1020
- Resulting Weight: **10321.73 gram**
- * Note: Drawing is shown in next page

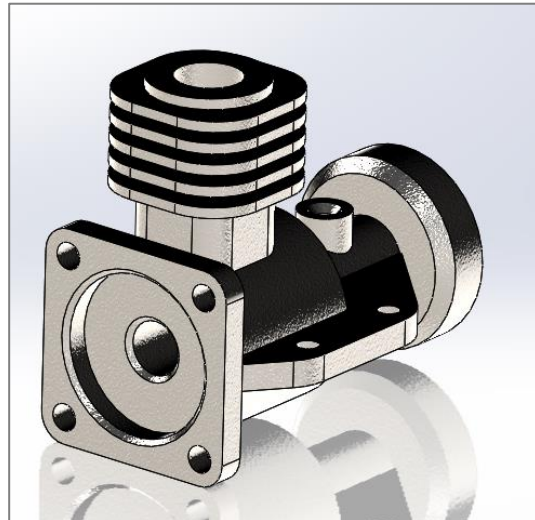
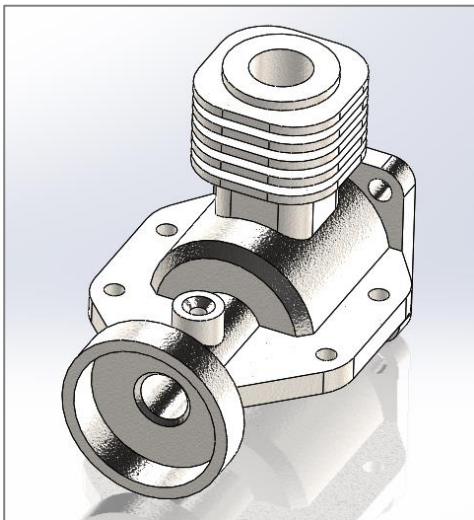
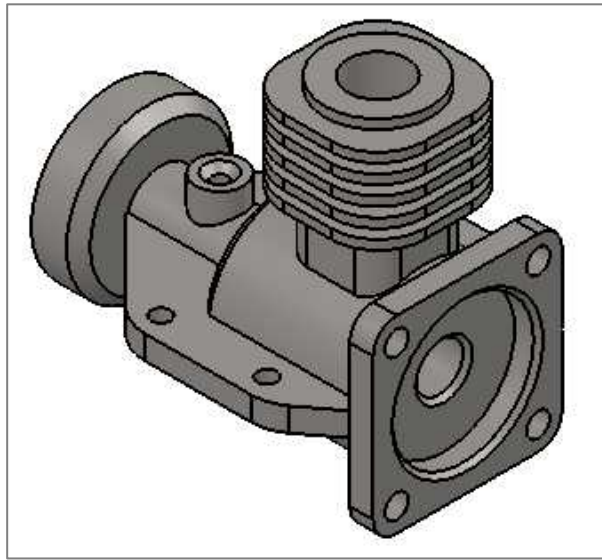


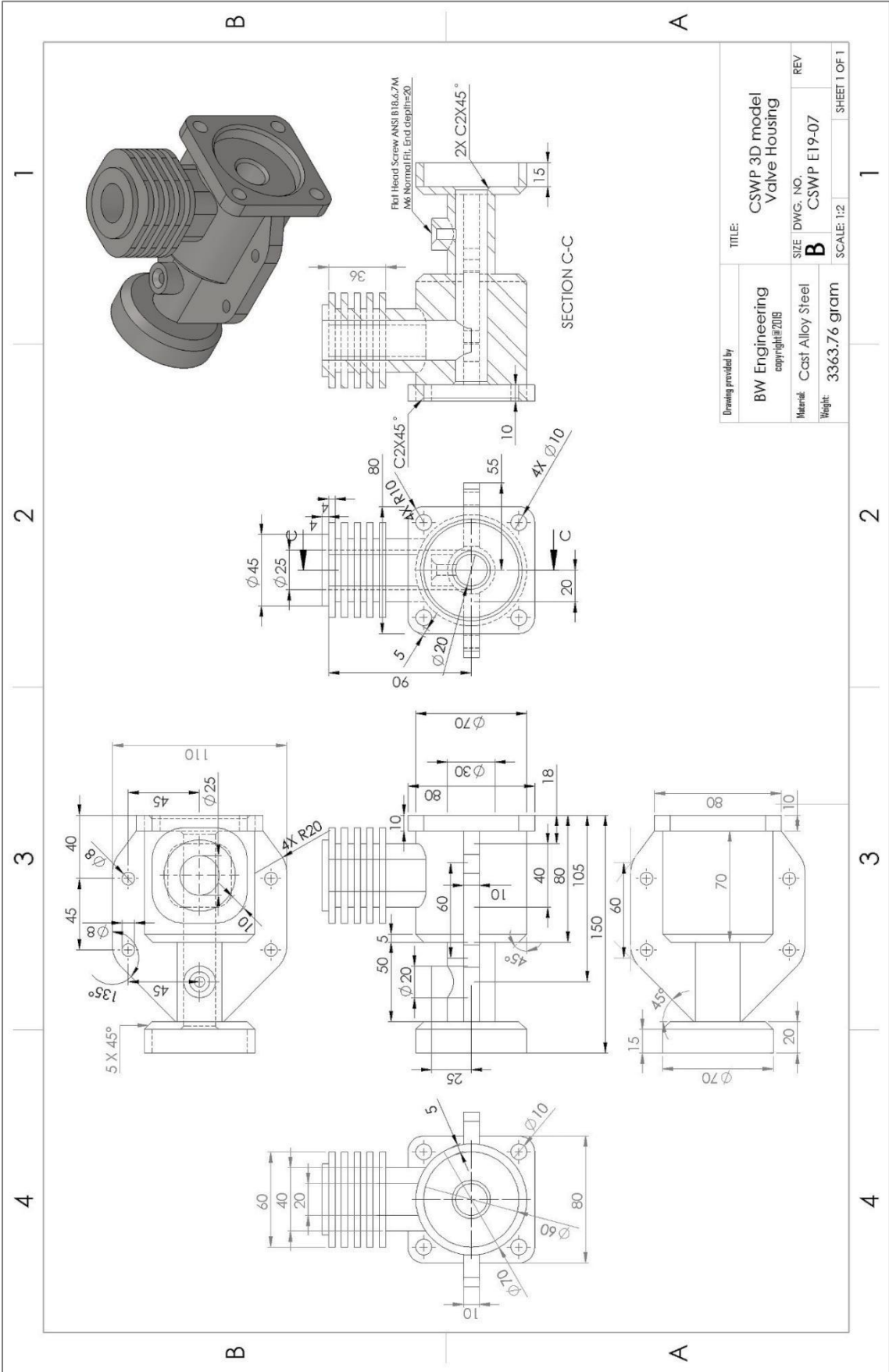


Exercise No.7 Valve Housing

Introduction

- Difficulty level: Easy | Normal | Hard | **Challenging**
 - Desired time: 25 min
 - No. of Features: 18~22
 - Unit: MMGS (2 decimal)
 - Material: Cast Alloy Steel
 - Resulting Weight: **336.76 gram**
- * Note: Drawing is shown in next page

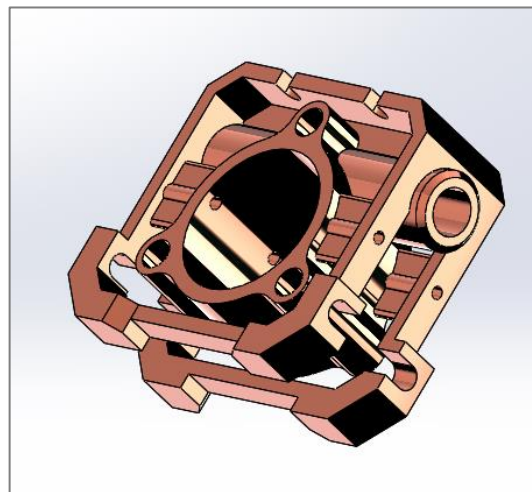
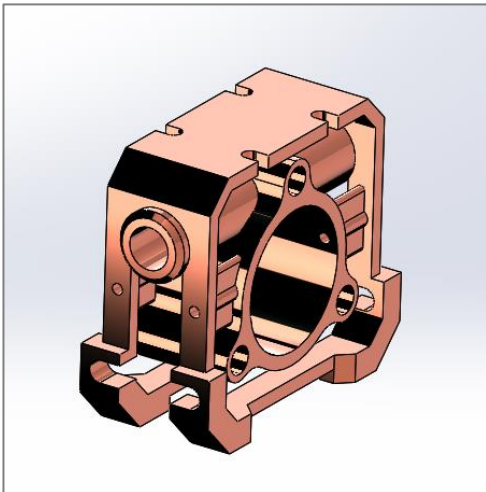
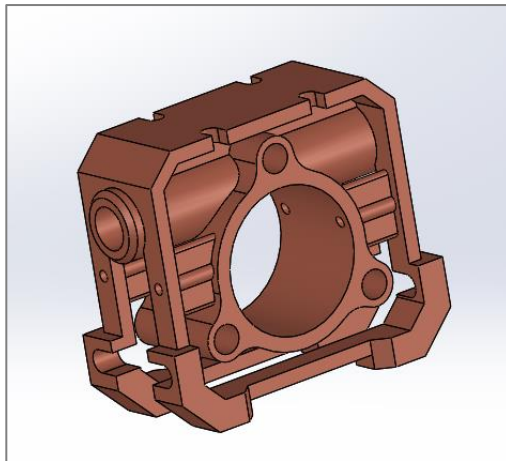


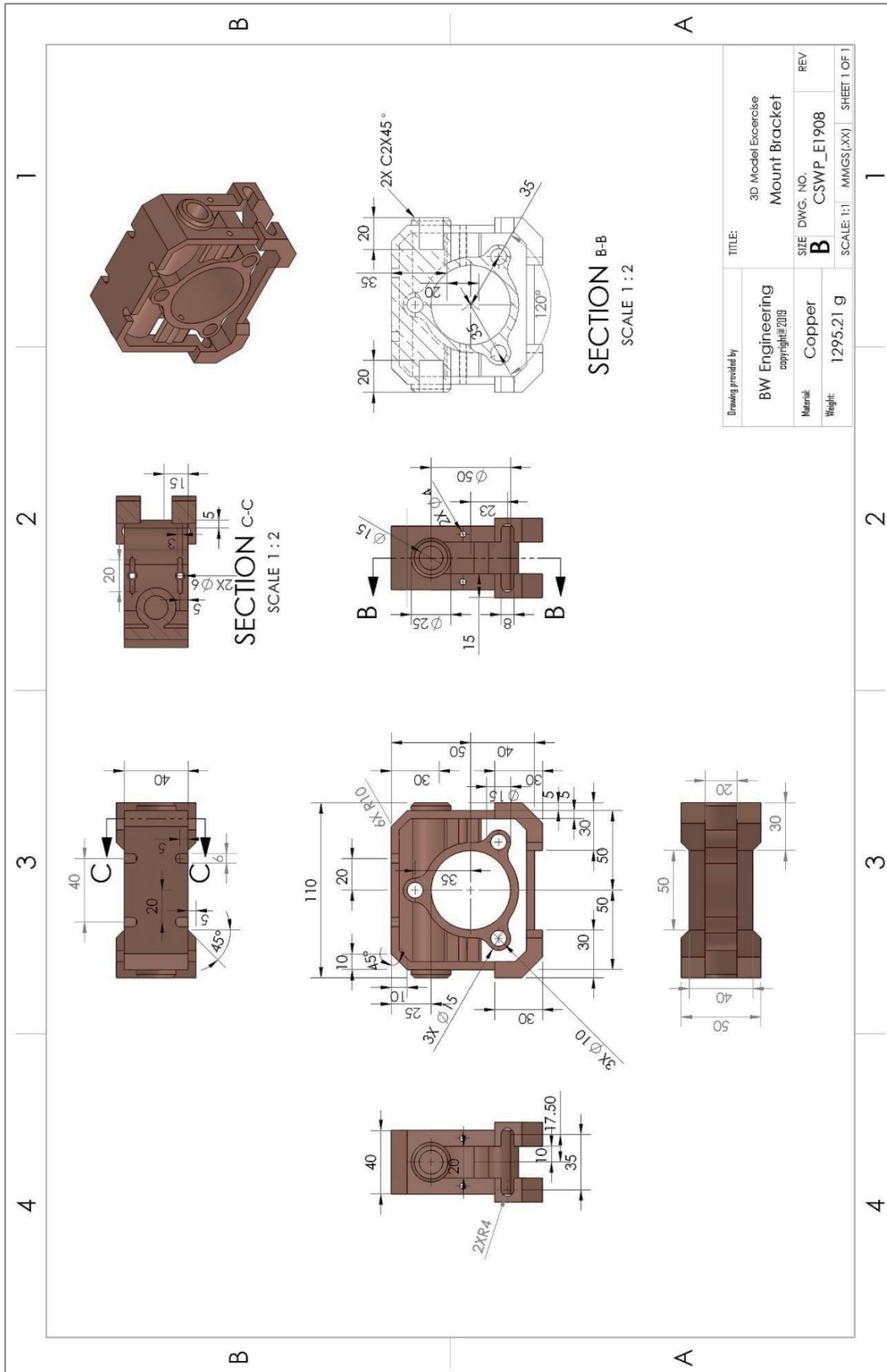


Exercise No.8 Mount Bracket

Introduction

- Difficulty level: Easy | Normal | Hard | **Challenging**
- Desired time: 30 min
- No. of Features: 22~25
- Unit: MMGS (2 decimal)
- Material: Cast Alloy Steel
- Resulting Weight: **1295.21 gram**
- * Note: Drawing is shown in next page

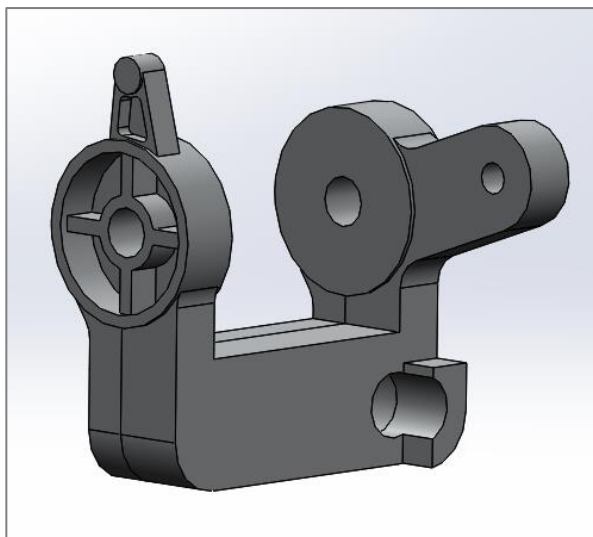
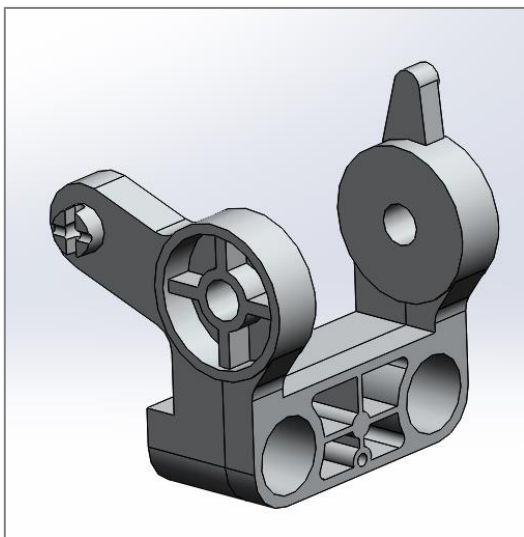
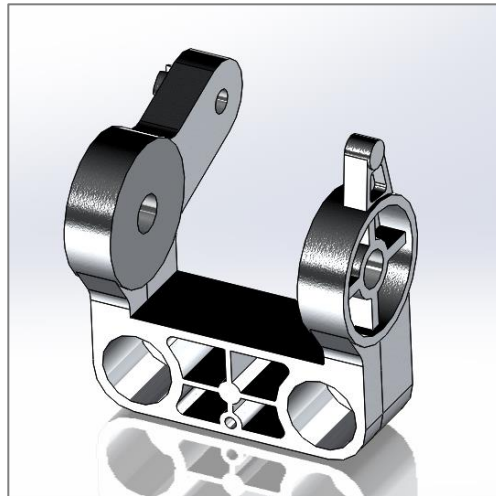


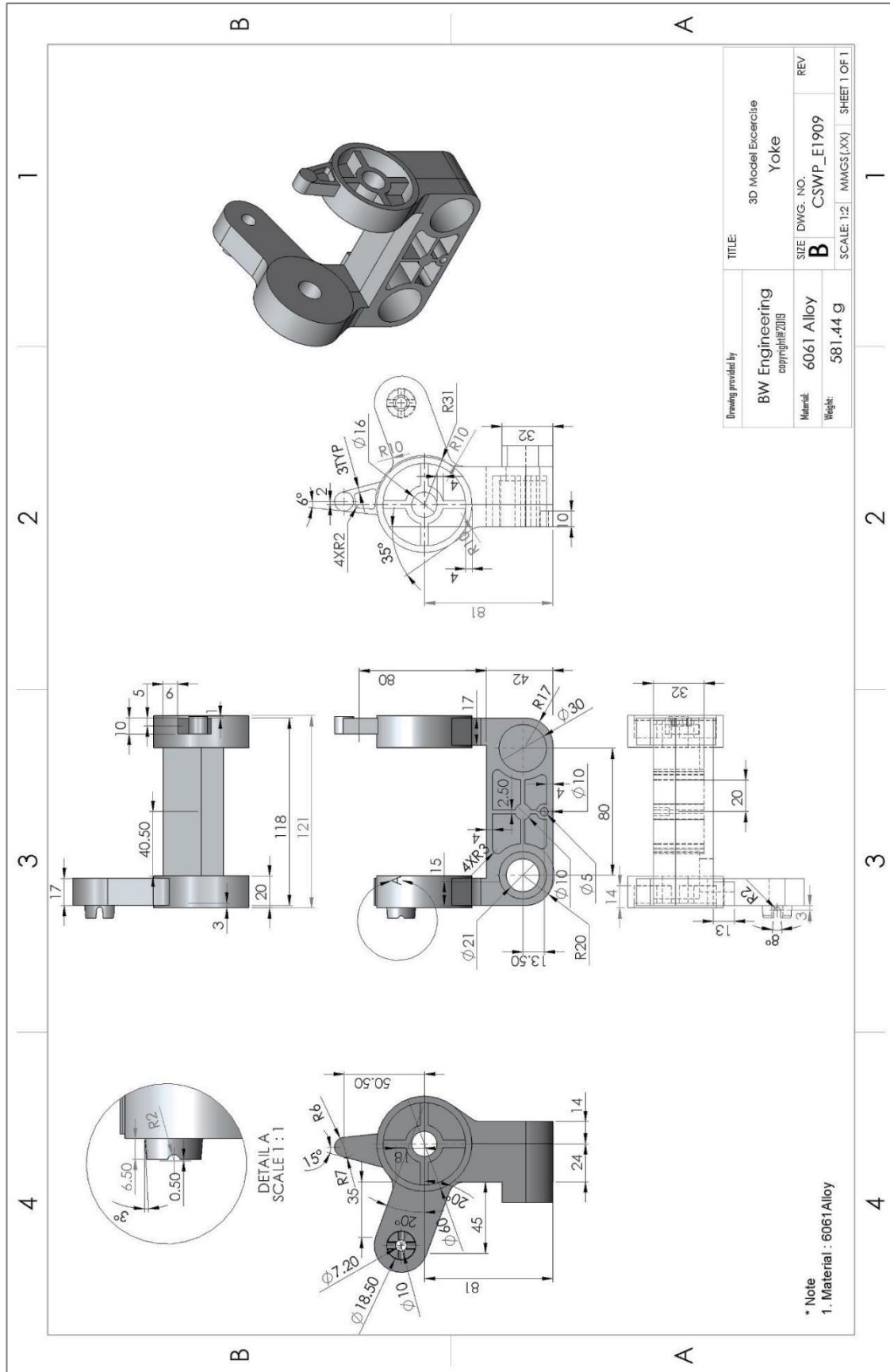


Exercise No.9 Yoke

Introduction

- Difficulty level: Easy | Normal | Hard | **Challenging**
- Desired time: 30 min
- No. of Features: 22~25
- Unit: MMGS (2 decimal)
- Material: 6061 Alloy
- Resulting Weight: **581.44 gram**
- * Note: Drawing is shown in next page

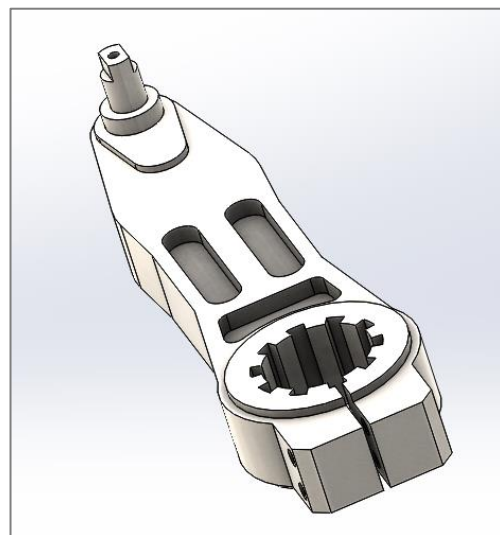
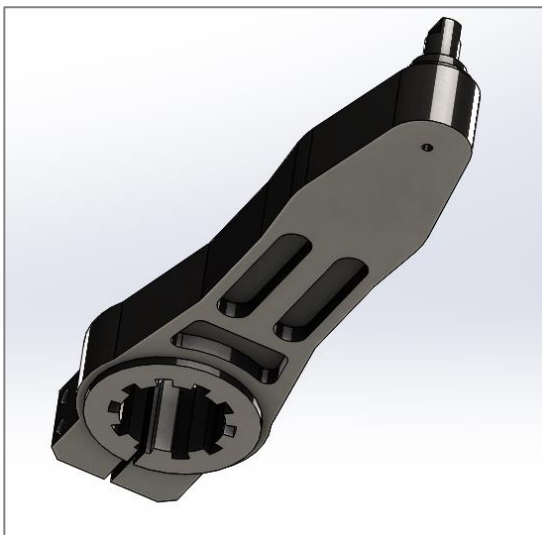
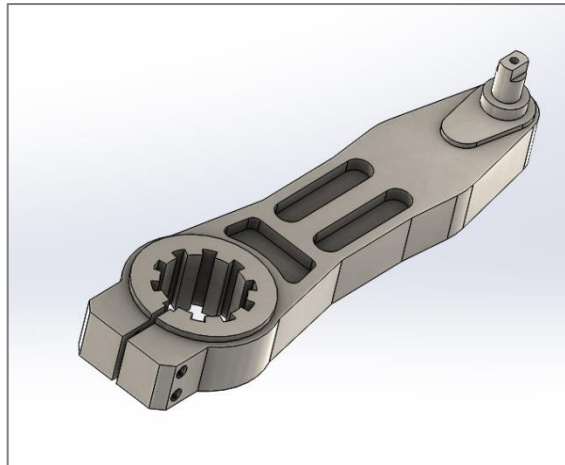


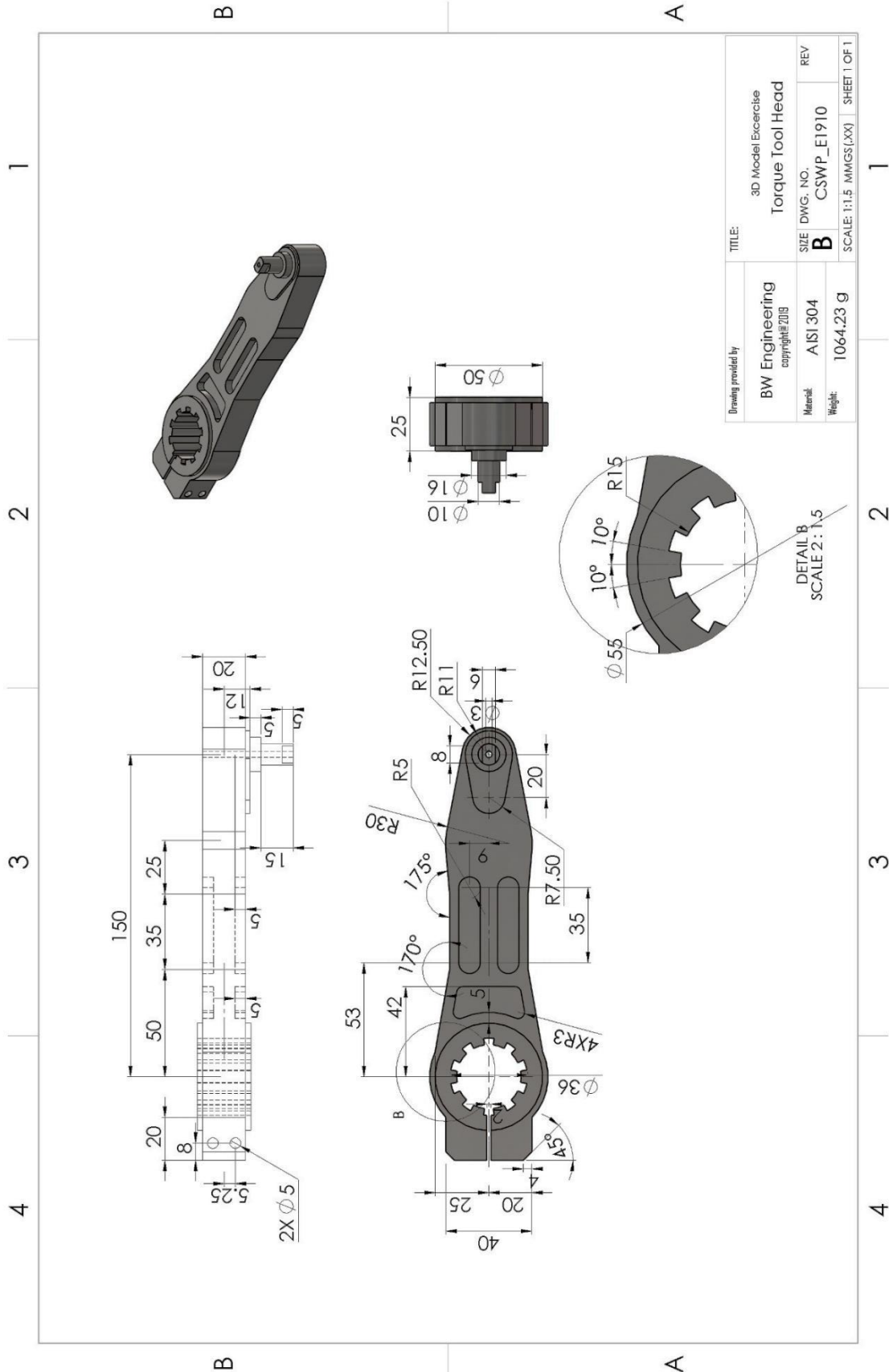


Exercise No.10 **Ratchet Tool**

Introduction

- Difficulty level: Easy | Normal | **Hard** | Challenging
- Desired time: 25 min
- No. of Features: 20~24
- Unit: MMGS (2 decimal)
- Material: AISI304
- Resulting Weight: **1064.23 gram**
- * Note: Drawing is shown in next page





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